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STOPPING WATER POLLUTION AT ITS SOURCE



THIRTY SEVEN MUNICIPAL WATER POLLUTION CONTROL PLANTS

PILOT MONITORING STUDY

VOLUME I

INTERIM REPORT

DECEMBER 1988



Jim Bradley Minister

THIRTY SEVEN MUNCIPAL WATER POLLUTION CONTROL PLANTS

Pilot Monitoring Study

Volume 1 Interim Report

Report prepared for: Ontario Ministry of the Environment Water Resources Branch

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EXECUTIVE SUMMARY

The Ontario Ministry of the Environment's Municipal Industrial Strategy for Abatement (MISA) Program is aimed at reducing contaminant loadings from direct industrial discharges and from municipal water pollution control plants (WPCPs). The MOE will address the municipal sector by the implementation of a Monitoring Regulation, requiring all Ontario WPCPs to monitor hazardous contaminants (HCs) in effluents and sludges. Subsequently, maximum concentration requirements of HCs in effluents and sludges will be established and a Compliance Regulation will be implemented.

The MOE, Environment Canada and the Municipal Engineers Association (MEA) sponsored this study to provide the information needed to support the development of a cost-effective and practical Monitoring Regulation.

This report is an interim report, summarizing study methodologies and presenting preliminary study findings. A more detailed analysis of the study data to determine factors affecting removal of HCs, and to allow prioritization of effluents and sludges and estimation of HC Loadings from study WPCPs will be presented in the final report.

Thirty-seven Ontario WPCPs were selected for the Pilot Monitoring Study, including 28 secondary treatment plants, 7 primary treatment plants and 2 lagoons. The field monitoring program involved sampling of influent, final effluent and raw and treated sludges for one to two 5 consecutive day periods at each of the study plants. In addition, plant performance parameters were monitored for the 2 weeks prior to sampling and during the sampling period.

Each sample was analyzed for all of the contaminants on a list established by MOE for this study. The monitoring list included 144 organic contaminants, 15 metals and conventional contaminants. Three laboratories contracted by the MOE, and the MOE Laboratory Services Branch (LSB), performed all of the analytical work.

A thorough field QA/QC program involved appropriate cleanliness and sample preservation procedures, duplicate sample collection of all field samples and field blank collection and analyses. Also, a comprehensive laboratory QA/QC program was carried out so that the applicability of each analytical result could be defined. This program involved analysis of method blanks, duplicate samples, field samples spiked with surrogate compounds and distilled water samples spiked with native compounds.

The individual plant data, including background information and analytical results from the sampling program were compiled and are presented in Appendix A (Volume II) of this report.

The analytical results from the sampling program were summarized for all of the plants for each type of sample. Metals were the most prevalently (most WPCPs) and most frequently detected contaminants in all sample types. Only 5 base neutral and acid extractable compounds were ever detected at more than 20 percent of plants for any sample type. Dioxin/furan compounds were detected at a maximum of 27 percent of plants in samples of raw sewage or final effluents (primary, secondary or lagoon) compared to 65 percent of plants for sludges. Approximately the same number (27 to 30) of pesticide/herbicide compounds were detected in raw sewage, secondary effluent and raw and treated sludge samples. The maximum frequency of detection and plant prevalency of pesticide/herbicide compounds was quite large and reasonably uniform for all sample types. The largest number of volatile organic compounds were detected in raw sewage and secondary effluent streams. The maximum frequency of detection of volatile organics compounds ranged from 15 to 55 percent, and the maximum plant prevalency ranged from 32 to 85 percent.

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1.0 INTRODUCTION AND PROJECT OBJECTIVES

1.1 Background

The Ontario Government's White Paper entitled, "Municipal-Industrial Strategy for Abatement (MISA)", released in June of 1986 by the Ontario Ministry of the Environment (MOE), outlined a new program to reduce the flow of toxic chemicals to the Province's receiving waters. MISA is aimed at reducing contaminant loadings from direct industrial discharges and from municipal water pollution control plants (WPCPs).

The program for municipal WPCPs will involve two stages. In the first stage, a Monitoring Regulation will be promulgated, requiring all WPCPs in Ontario to monitor HCs in effluents and sludges. In the second stage, maximum concentration requirements of HCs in effluents and sludges will be established and Compliance Regulations will be implemented.

In order that MOE can proceed with the establishment of the Monitoring Regulations, there is a need to determine the nature and incidence of HCs in WPCP effluents and sludges, to examine factors affecting the removal of HCs in wastewater treatment facilities and to evaluate the impact of upstream sanitary sewer users upon the HCs observed in WPCP effluents and sludges.

This study was jointly sponsored by the MOE, Environment Canada and the Municipal Engineers Association (MEA) with a goal of providing the information needed to support the development of a cost-effective and practical Monitoring Regulation.

The following is an interim report summarizing the study methodology used in the 37 WPCP study and presenting preliminary study findings. A more detailed analysis of the study data to determine factors affecting removal of HCs, and to allow prioritization of HCs in effluents and sludges and estimation of HC loadings from the study WPCPs will be presented in the final report.

The report has been organized into two volumes. Volume I has the following contents:

Section 2.0 - Field Program Methodology

This section presents a detailed description of the field program methodology.

Section 3.0 - Analytical Methodology

This section presents details of analytical methods as well as indicating the laboratories participating in the study.

Section 4.0 - WPCP Characteristics

This section outlines the characteristics of all WPCPs in Ontario and compares their characteristics with the 37 WPCPs studied.

Section 5.0 - Results and Analysis

This section presents in summary the preliminary results of the monitoring program.

Volume II of the preliminary report is comprised of individual appendices presenting design, operating and other background data for each WPCP as well as a complete summary of the preliminary results of monitoring.

1.2 Study Objectives

The goal of the Municipal WPCP Pilot Program was to obtain the information necessary to support the development of cost-effective and practical Monitoring Regulation for the municipal sector.

Specific project objectives included:

- To carry out a well designed and rigorously controlled program of hazardous contaminant sampling of sludge and sewage streams at 37 Ontario WPCPs.
- To summarize all study findings into a comprehensive project report and to provide a well organized database of HC and other results as well as process and flow measurements in a suitable electronic format.
- To develop a prioritized list of contaminants observed in the study.
- 4. To assess the effectiveness of WPCPs in removing HCs and to identify (insofar as possible) the factors influencing removal efficiencies including any 'key' variables that may be employed as indicators of HC removal effectiveness.
- To estimate the loadings discharged in the sludge and liquid effluents of the study WPCPs.

- 6. To assess the impact of industrial, residential and commercial sanitary sewer inputs upon the nature and loadings of HCs observed in the raw wastewaters, and sludges.
- 7. To identify and review major concerns affecting the implementation of the monitoring regulation and to make recommendations as needed to address any anticipated implementation problem areas.

1.3 Scope

The field monitoring program involved sampling of influent, final effluent and raw and treated sludges for one to two 5 consecutive day periods at each of the 37 study plants. Each sample was analyzed for all of the contaminants on a list established by MOE for this study. The monitoring list included 144 organic contaminants, 15 metals and conventional contaminants. A comprehensive QA/QC program was carried out in order to be able to define the applicability of the analytical results.

Three laboratories contracted by MOE (Zenon Environmental Ltd., Mann Testing Ltd. and Enviroclean Ltd.) and MOE Laboratory Services Branch (LSB) carried out all of the analytical work, under the direction of MOE.

The Project Liaison Committee directed the field program and defined the requirements for subsequent analytical data summarization, analysis and report writing.

2.1 Selection of WPCPs

The WPCPs for the study were selected by MOE on the basis of the following criteria:

No. Criteria

- 1. All WPCPs which discharged more than 45,000 m³/day effluent in 1986, regardless of treatment type. There were 16 secondary treatment plants and 7 primary treatment plants that fit this criterion. These WPCPs contributed 69.1 percent of the total flows discharged by the 406 plants in Ontario in 1986.
- Secondary WPCPs that were previously monitored by the Upper Great Lakes Connecting Channels (UGLCC) study in the summer of 1986.

Eleven plants were monitored by UGLCC(Ref.1). Three of the 11 plants were already selected under Criterion 1. Consequently, only 5 additional secondary plants with an average daily flow in 1986 of less than 45,000 m³/day were selected under Criterion 2 alone. Three plants (Chatham secondary WPCP, Amhurstburg and Point Edward, primary WPCPs) were not remonitored in this study.

3. Small secondary treatment plants with flows less than 20,000 m³/d which produced effluent quality typical of the effluent quality achieved in Ontario by well-operated secondary WPCPs were also selected. "Typical" effluent quality was defined as effluent BOD and TSS concentrations between 8 and 15 mg/L, and total phosphorus (TP) concentrations between 0.7 and 1.0 mg/L.

Plant location was also considered in plant selection. It was more desirable in terms of economics and logistics, to sample at WPCPs that were in proximity to those selected in Criteria 1 and 2. Seven plants were selected under Criterion 3.

4. Two lagoons were also selected for monitoring. Lindsay is served by the largest lagoon in Ontario. Niagara-on-the-Lake has a medium sized lagoon treatment facility.

In total, 37 WPCPs were selected by the above criteria. Table 2-1 presents a list of these plants indicating the criteria under which they were selected. Figure 2-1 presents a map showing the location of each WPCP.

Table 2-1 ONTARIO WPCPs SELECTED FOR THE MONITORING PROGRAM

Criteria	WPCP	Treatment Type
	Brantford	Secondary
	Burlington (Skyway)	Secondary
1. 1986 Average	Cornwall	Primary
1. 1500 Melage	Guelph	Secondary - Tertiary
Daily Flow	Hamilton	Secondary
Daily Flow	Kingston City	Primary
$>45,000 \text{ m}^3/d$	Kitchener	Secondary
745,000 m / d	London (Greenway)	Secondary
	Mississauga (Clarkson)	Secondary
	Mississauga (Lakeview)	Secondary
	Niagara Falls (Stamford)	Secondary
	Ottawa (Green Cr.)	•
		Primary
	Pickering (Duffin Cr.)	Secondary
	Peterborough	Secondary
	Sarnia	Primary
	Sault Ste.Marie (East)	Primary
	Sudbury	Secondary
	Thunder Bay	Primary
	Toronto (Highland Cr.)	Secondary
	Toronto (Humber)	Secondary
	Toronto (Main)	Secondary
	Waterloo	Secondary
	Windsor (Westerly)	Primary
	Belle River (Maidstone)	Secondary
2. UGLCC and	Moore (Corunna)	Secondary
1986 Average	Sault Ste.Marie (West)	Secondary
Daily Flow	Wallaceburg	Secondary
<45,000 m ³ /d	Windsor (Little River)	Secondary
	Grimsby (Baker Road)	Secondary
Small Secondary	Kingston Township	Secondary
WPCPs	London (Pottersburg)	Secondary
1986 Average	Oakville (South East)	Secondary
Daily Flow	Paris	Secondary
<20,000 m ³ /d	Toronto (North)	Secondary
	Whitby (Pringle Creek 1)	Secondary
	Linday	Lagoon
4. Lagoons	Lindsay	Lagoon
4. Lagoons	Niagara-on-the-Lake	Lagoon

2.2 Selection of Target Compounds

The listing of target monitoring parameters for the entirety of the MISA program is presently embodied in the Environmental Monitoring Priority Pollutant List (EMPPL) (Ref. 2). At the time the 37 WPCP study was initiated the EMPPL listing was not as yet formulated and consequently an alternative but nonetheless comprehensive listing of contaminants was identified.

The organic contaminant list used in the present study includes all of the 126 organic contaminants monitored in the U.S. Environmental Protection Agency's (USEPA) Priority Pollutant List (PPL), established in 1972 (Ref. 3). The list also includes additional chlorinated pesticides, nitrogen phosphorus herbicides and phenoxy acid herbicides.

The organic contaminants that were monitored are presented in Table 2-2(a). The list includes 42 volatile organic compounds, 57 base neutral and acid extractable compounds, 35 pesticides and herbicides, and 10 dioxin furans (PCDD/PCDF) compounds. In total there were 144 organic contaminants monitored.

Fifteen metals were also monitored during the study, which are listed in Table 2-2(b). This list includes all of the metals presently regulated in Ontario in sludges utilized on agricultural land. A number of conventional contaminants, cyanide and total phenolics were monitored during the study. These contaminants were selected as general plant performance indicators. The list of conventional contaminants is presented in Table 2-2(c).

Table 2-3 presents those HCs included on the EMPPL but not monitored in this study. This list consists of 80 contaminants.

The organic contaminant list selected for this study is the same as the one used for monitoring by the City of Metropolitan Toronto at their 4 WPCPs in 1984, 1985 and 1986. This list was chosen because the MOE were confident that these contaminants can be satisfactorily monitored and that a long-term data base would be available for the 4 Toronto plants.

2.3 Monitoring Program

The sampling program at the 37 selected plants began in January 1987 and was completed in July 1987. In general, each monitoring period involved 2 weeks of pre-monitoring of plant performance and 5 days of sampling. Seventeen plants were monitored for two periods and 20 were monitored for one period only.

Table 2-2(a) ORGANIC CONTAMINANTS MONITORED IN THE STUDY

Base Neutral and		D+1-13	W-1-643-
Acid Extractable	51 1 /5	Pesticides	Volatile
Compounds	Dioxins/Furans	and Herbicides	Organic Compounds
2 4 5 Madahlawanhanal	Tetrachlorodibenzodioxins	Toyanhene*	1,1,1-Trichloroethane*
2,4,5-Trichlorophenol	Tetrachlorodibenzofurans		1,1,2,2-Tetrachloroethane
2,4,6-Trichlorophenol	Pentachlorodibenzodioxins		1,1,2-Trichloroethane
2,4-Dichlorophenol		Silvex*	1,1-Dichloroethene
2,4-Dimethyl phenol	Pentachlorodibenzofurans		
2,4-Dinitrotoluene	Hexachlorodibenzodioxins	PP-DDT*	1,2-Dichlorobenzene
2,4-Dinitro-o-cresol	Hexachlorodibenzafurans	PP-DDE*	1,2-Dichloroethane
2,6-Dinitrotoluene	Heptachlorodibenzodioxins		1,2-Dichloropropane
2 Hydroxy-toluene (O-Cresol)		Photomirex*	1,3-Dichlorobenzene
2-Chloronaphthalene	Octachlorodibenzodioxin	PCNB*	1,4-Dichlorobenzene
2-Chlorophenol	Octachlorodibenzofuran	Oxychlordane*	1-Octene*
2-Nitrophenol*		Mirex*	2-Chloroethylvinyl ether*
3 Hydroxy-toluene (m-Cresol)		Methoxychlor*	3-Chloro-1-propene*
4 Hydroxy-toluene (P-Cresol)		Hexacloroethane	3-Chloro-toluene*
4-Bromophenyl phenyl ether		Hexachlorocyclopentadiene	
4-Chlorophenyl phenyl ether		Hexachlorobutadiene	Acrylonitrile
9H Fluorene		Heptachlor Epoxide*	Benzene
Acenapthene		Heptachlor*	Bromodichlorobenzene*
Acenapthylene		HCB	Bromodichloromethane
Alpha-naphthylamine*		Gamma-Chlordane*	Bromoethane
Ametryn* (PH)		Gamma-BHC8	Bromoform
Anthracene		Eldrin Aldehyde*	Carbon tetrachloride
Atrazine* (PH)		Eldrin*	Chlorobenzene
Benzo (A) anthracene		Endosulfan Sulphate*	Chloroethane*
Benzo (A) pyrene		Dieldrin*	Chloroform
Benzo (B) fluoranthene		Delta-BHC*	Chloromethane
Benzo (K) fluoranthene		Captan*	cis-1,3-Dichloropropene
Beta-napthylamine*		Beta-Endosulfan*	cis-1,2-Dichloroethylene*
Biphenyl		Beta-BHC*	Dibromochloromethane
bis(2-Chloro ethoxy) methane		Alpha-Endosulfan*	Dichlorodifluoromethane*
bis(2-Chloro ethyl) ether		Alpha-Chlordane*	Diethyl ether*
bis(2-Chloroispropyl) ether		Alpha-BHC*	Ethylbenzene
bis(2-ethyl hexyl) phthalate		Aldrin*	Hexane*
Butyl benzyl phthalate		2,4-Dichlorophenoxyacetic	
Chrysene		acid (2,4-D)*	Methylene chloride
Diazinon* (PH)		2,4-5Trichlorophenoxy-	Styrene
Dibenzo (AH) anthracene		acetic acid	Tetrachloroethene
Dicloran* (PH)		(2,4,5-T)*	Toluene
Diethyl phthalate*		1,2,4-Trichlorobenzene	Trans-1,3-Dichloropropene
Dimethyl phthalate*			Trichloroethene
Dipbenyl ether			Trichloroflouromethane
Di-n-butyl phthalate			Vinyl bromide*
Di-n-octyl phthalate			Vinyl chloride
Fluoranthene			
Indeno (123-CD) pyrene			
Malathion* (PH)			
Naphthalene			
Nitrobenzene*			

Notes:

N-Nitroso Diphenylamine
N-Nitroso-di-n-propyl-amine
Parathion ethyl* (PH)
Parathion methyl* (PH)
Pentachlorophenol
Phenanthrene
Phenol
Pyrene

P-chloro-M-cresol* Tri-n-tolyl phosphate

^{*} Contaminants not included in EMPPL (Ref. 2)

⁽PH) Pesticide/Herbicide compound grouped with Base neutral and acid extractable compounds for analyses

Table 2-2(b) LIST OF METALS MONITORED IN THE STUDY

Priority Metals: (Regulated by MOE in sludge applied to agricultural land)	Arsenic Cadmium Chromium Cobalt Copper Mercury Molybdenum Nickel Lead Selenium Zinc	As Cd Cr Co Cu Mg Mo Ni Pb Se Zn
Other Metals:	Aluminum Beryllium Silver Strontium	Al Be Si St

Table 2-2(c)
CONVENTIONAL CONTAMINANTS MONITORED IN THE STUDY

Raw Wastewater & Effluent Streams	Sludges
рН	рН
Biochemical Oxygen Demand (BOD ₅)	Chemical Oxygen Demand (COD)
Chemical Oxygen Demand (COD)	Nitrites (NO ₂)
Dissolved Organic Carbon (DOC)	Nitrates (NO ₃)
Total Suspended Solids (TSS)	Ammonia (NH ₃)
Total Volatile Suspended Solids (VSS)	
Filtered Nitrite (NO ₂)	Total Kjeldhal Nitrogen (TKN)
Filtered Nitrates (NO ₃)	Total Phosphorus (TP)
Filtered Ammonia (NH ₃)	Total Solids (TS)
Total Kjeldhal Nitrogen (TKN)	Total Volatile Solids (VS)
Total Phosphorus (TP)	Total Phenolics (4AAP)
Turbidity	Cyanide
Total Phenolics (4AAP)	
Cyanide (Total)	

Table 2-3 EMPPL (Ref. 2) ORGANIC CONTAMINANTS NOT MONITORED IN THE PRESENT STUDY

1,1,3,3-Tetrachloroacetone 1,2,3,4-Tetrachlorobenzene 1,2,3,5-Tetrachlorobenzene 1,2,3-Trichlorobenzene 1,2,4,5-Tetrachlorobenzene 1,3-Butadiene 1,4-Dioxane 1-Chloronaphthalene 1-Methylnaphthalene 1-Mitronaphthalene 1-Nitronaphthalene 2,3,4,5-Tetrachlorophenol 2,3,4,6-Tetrachlorophenol 2,3,5-Trichlorophenol 2,3,5-Trichlorophenol 2,3,7,8-Tetrachlorophenol 2,3,7,8-Tetrachlorodibenzo-p-dioxin 2,4,5-Trichlorotoluene 2,6-Di-t-butyl-4-methylphenol 2-Hydroxybiphenyl 2-Methylnaphthalene 3,3 Dichlorobenzidene 4,6-Dinitro-o-cresol 4-Aminoazobenzene 4-Chloro3-methylphenol 4-Hydroxybiphenyl Abietic Acid Acenaphthene, 5-nitro Acridine Aniline Benzaldehyde Benzeneacetonitrile Benzidine Benzyl alcohol Bis (2-chloroethyl) ether Bromomethane Butanal Camphene Chlorodehydroabietic acid Chromium (hexavalent) Dehydroabietic acid Dimethyl disulphide Diphenylamine Ethylene dibromide
Dehydroabietic acid Dimethyl disulphide Diphenylamine Ethylene dibromide Ethylene thiourea
Eugenol Formaldehyde Hydrazine Hydroxycyclohexane (Cyclohexanol)

Indole Isopimaric Levopimaric acid Limonene Mercapto benzothiazole Methyl ethyl ketone Methyl styrene Neoabietic acid N-Methylformamide N-Nitrosodimethylamine Octachlorostyrene Oil and grease Oleic Acid Pentachlorobenzene Perylene Pimaric acid Specific conductance Sulphide Tetrachloroacetone Tetrachloroqualocal Tetraethyl lead Tetra-alkyl lead (Total) Thiourea Total organic carbon (TOC) Trichlorogualacol Triethyl lead Trimethylbenzenes (1,2,3 isomers)Trimethylnaphthalene Tri-alkyl lead (Total) Tri-n-Butylphosphate

During the 5 day sampling period, 24-hour composite samples of raw sewage and final effluent (primary, secondary or lagoon) were collected daily. Also, 5-day composite samples of raw sludge and treated sludge were collected.

2.3.1 WPCP Sampling Schedule

The sampling schedule was organized into two separate survey programs. The "winter" program began on 19 January 1987 and continued until 30 March 1987, involving sampling at 25 WPCPs. The "summer" program occurred between 20 April 1987 and 26 July 1987 and included 29 WPCPs. Seventeen of the WPCPs were sampled in both programs, and the remaining 20 were sampled in only one program. Table 2-4 presents the plants sampled in each program.

It should be noted that the labels "winter" and "summer" were used throughout the study to describe the sampling schedules, however, did not necessarily imply a significant difference in weather temperature or operating conditions between the winter and summer programs.

The study requirements outlined that the monitoring of WPCPs take place during periods of "typical" operation. Operation was considered "typical" if the operating conditions were within a normal range expected for the particular plant. This encompassed a wide range of operational conditions, including minor process upsets and equipment malfunction.

Due to limited time and resources, it was not feasible to monitor plants during periods of exceptional circumstances. Therefore, plant monitoring during periods of process shut downs, process changeovers, large industrial spills and major upsets was avoided, where possible.

In general treatment plants were sampled for 5 consecutive days. Four plants were sampled for an extended 7 day period during the summer program. Specifically, they were: Kitchener WPCP, Ottawa (Green Creek) WPCP, Mississauga (Clarkson) WPCP and Toronto (Highland Creek) WPCP. Tables 2-5 and 2-6 respectively present the winter and summer sampling program schedules.

2.3.2 Pre-Monitoring Site Inspections

Prior to the monitoring at each of the 37 WPCPs in the present study, a senior CANVIRO engineer accompanied by a MOE staff member visited the site. The purposes of this initial visit were to define the sampling sites and to arrange for collection of design information, plant operating records and photographs of the site.

Table 2-4
WPCP SAMPLING PROGRAMS

Plant	Code	Winter	Summer
Belle River (Maidstone)	MA	x	
Brantford	BR	X	X
Burlington (Skyway)	BU	X	Х
Cornwall	CO	X	X
Grimsby (Baker Rd.)	GR		Х
Guelph	GU	X	Х
Hamilton (Woodward)	HA	X	Х
Kingston City	KC		Х
Kingston Township	KT		Х
Kitchener	KI	X	Х
Lindsay	LI		Х
London (Greenway)	LG	X	Х
London (Pottersburg)	LP	X	λ
Mississauga (Clarkson)	MC	X	Х
Mississauga (Lakeview)	ML	X	Х
Moore (Corunna)	CR	X	
Niagara Falls (Stamford)	NF	X	Х
Niagara-on-the-Lake	NL		Х
Oakville (SE)	OA		Х
Paris	PA		X
Peterborough	PT	X	Х
Pickering (Duffin Creek)	PD	X	X
Sarnia	SA	X	
Sudbury	SU		Х
Sault Ste. Marie (East/Old)	SE	Х	
Sault Ste. Marie (West/New)	SW	X	
Thunder Bay	TB		Х
Toronto (Highland Creek)	TS	X	Х
Toronto (Humber)	TH	X	X
Toronto (Main)	TM	Х	Х
Toronto (North)	TN		Х
Wallaceburg	WA	X	
Waterloo	WT	X	Х
Whitby (Pringle Creek #1)	WP		X
Windsor (Little River)	WL	X	
Windsor (Westerly)	WW	X	
Ottawa (Green Creek)	OT		Х

Table 2-5 WINTER SAMPLING SCHEDULE

Plant	Sam	pli	ng	Date	es_
Kitchener	Jan	19	_	Jan	23
Waterloo	Jan	19	-	Jan	23
Burlington	Jan	19	-	Jan	23
Toronto (Main)	Jan	26	-	Jan	30
Mississauga (Clarkson)	Mar	2	-	Mar	6
Mississauga (Lakeview)	Mar	2	-	Mar	6
Toronto (Humber)	Feb	9	-	Feb	13
London (Greenway)	Feb	16	-	Feb	20
London (Pottersburg)	Feb	16	-	Feb	20
Windsor (Little River)	Feb	16	-	Feb	20
Windsor (Westerly)	Feb	16	-	Feb	20
Hamilton (Woodward)	Feb	23	-	Feb	27
Toronto (Highland Creek)	Mar	16	-	Mar	20
Sault Ste. Marie (West)	Mar	16	-	Mar	20
Sault Ste. Marie (East)	Mar	16	-	Mar	20
Peterborough	Mar	9	-	Mar	13
Sarnia	Feb	2	-	Feb	6
Moore (Corunna)	Feb	2	-	Feb	6
Wallaceburg	Feb	2	-	Feb	6
Belle River (Maidstone)	Feb	2	-	Feb	6
Brantford	Mar	9	-	Mar	13
Pickering (Duffin Creek)	Mar	30	-	Feb	3
Cornwall	Mar	30	-	Feb	3
Guelph	Mar	27	-	Mar	27
Niagara Falls (Stamford)	Mar	23	-	Mar	27

Table 2-6 SUMMER SAMPLING SCHEDULE

Apr 20 - Apr	Plant	Sampling Dates
### Springs (Baker Rd.) ### Cornwall ### Apr 20 - Apr 2	Peterborough	Apr 20 - Apr 2
Cornwall Guelph May 4 - May Guelph May 1 - May May 11 - May May 11 - May May 11 - May May 18 - May May 25 - May May 26 - May May 27 - May May 28 - May May 29 - May May 29 - Jun May 20 - Jun May 20 - Jun May 21 - May May 21 - May May 22 - Jun May 23 - May May 25 - May May 25 - May May 26 - May May 27 - May May 28 - May May 18 May 18	Lindsay	Apr 20 - Apr 2
Suelph May 4 - May 6 - May 11 - May 7 - May 11 - May 12 - May 13 - May 13 - May 13 - May 14 - May 18 -	Grimsby (Baker Rd.)	Apr 20 - Apr 2
Paris May 11 - May Sudbury May 11 - May Pickering (Duffin Creek) May 18 - May Ringston City May 18 - May Ringston Township May 18 - May Whitby (Pringle Creek #1) May 25 - May Riagara Falls (Stamford) May 25 - May Riagara-on-the-Lake May 25 - May Chunder Bay Jun 1 - Jun Coronto (North) Jun 8 - Jun Dakville (SE) Jun 8 - Jun Coronto (Main) Jun 15 - Jun Rississauga (Clarkson)* Jun 22 - Jun Roronto (Highland Creek)* Jun 29 - Jul Roronto (Greenway) Jul 6 - Jul Rorondon (Pottersburg) Jul 6 - Jul Rorantford Jul 6 - Jul Rississauga (Lakeview) Jul 13 - Jul Raterloo Jul 20 - Jul Roronto (Humber) Jul 20 - Jul	Cornwall	May 4 - May
Sudbury Pickering (Duffin Creek) Kingston City Kingston Township May 18 - May 18	Guelph	May 4 - May
Pickering (Duffin Creek) May 18 - May	Paris	May 11 - May 1
Kingston City May 18 - May 18	Sudbury	May 11 - May 1
Kingston Township May 18 - May 25 - May 28 - May 29 - Ma	Pickering (Duffin Creek)	May 18 - May 2
Whitby (Pringle Creek #1) May 18 - May 3 Glagara Falls (Stamford) May 25 - May 3 Glagara-on-the-Lake May 25 - May 3 Chunder Bay Jun 1 - Jun 3 Coronto (North) Jun 8 - Jun 3 Coronto (Main) Jun 15 - Jun 1 Coronto (Main) Jun 22 - Jun 3 Coronto (Highland Creek)* Jun 29 - Jul 3 Coronto (Highland Creek)* Jun 29 - Jul 3 Condon (Greenway) Jul 6 - Jul 1 Condon (Pottersburg) Jul 6 - Jul 1 Crantford Jul 6 - Jul 1 Crantford Jul 13 - Jul 1 Cratawa (Green Creek)* Jul 20 - Jul 2 Cronto (Humber) Jul 20 - Jul 2	Kingston City	May 18 - May 2
May 25 - May 3 May 25 May 25 - May 3 May 25 - May 3 May 25 - May 3 May 25 - May	Kingston Township	May 18 - May 2
May 25 - May 3 May 25 - May 3 May 25 - May 4 May 25 - May 5 May 25 - May 6 May 25 - May 7 May 7 May 8 - Jun 1 Jun 8 - Jun 1 May 15 - Jun 1 May 16 May 17 May 18 May	Whitby (Pringle Creek #1)	May 18 - May 2
Chunder Bay Jun 1 - Jun Coronto (North) Jun 8 - Jun 1 Coronto (Main) Jun 15 - Jun 1 Coronto (Main) Jun 22 - Jun 2 Curlington (Skyway) Jun 22 - Jun 2 Coronto (Highland Creek)* Jun 29 - Jul 2 Coronto (Woodward) Jun 29 - Jul 2 Condon (Greenway) Jul 6 - Jul 1 Condon (Pottersburg) Jul 6 - Jul 1 Crantford Jul 6 - Jul 1 Classissauga (Lakeview) Jul 13 - Jul 1 Caterloo Jul 20 - Jul 2 Cottawa (Green Creek)* Jul 20 - Jul 2 Coronto (Humber) Jul 20 - Jul 2	Niagara Falls (Stamford)	May 25 - May 2
Coronto (North) Jun 8 - Jun 1 Coronto (Main) Jun 15 - Jun 1 Coronto (Main) Jun 22 - Jun 2 Curlington (Skyway) Jun 22 - Jun 2 Coronto (Highland Creek)* Jun 29 - Jul 2 Coronto (Woodward) Jun 29 - Jul 3 Condon (Greenway) Jul 6 - Jul 1 Coronto (Pottersburg) Jul 6 - Jul 1 Crantford Jul 6 - Jul 1 Crantford Jul 13 - Jul 1 Claterloo Jul 20 - Jul 2 Cattawa (Green Creek)* Jul 20 - Jul 2 Coronto (Humber) Jul 20 - Jul 2	Niagara-on-the-Lake	May 25 - May 2
Dakville (SE) Jun 8 - Jun 1 Coronto (Main) Jun 15 - Jun 1 Dississauga (Clarkson)* Jun 22 - Jun 2 Durlington (Skyway) Jun 29 - Jul 2 Coronto (Highland Creek)* Jun 29 - Jul 2 Damilton (Woodward) Jun 29 - Jul 2 Dondon (Greenway) Jul 6 - Jul 1 Dondon (Pottersburg) Jul 6 - Jul 1 Dississauga (Lakeview) Jul 13 - Jul 1 Daterloo Jul 20 - Jul 2 Dattawa (Green Creek)* Jul 20 - Jul 2 Doronto (Humber) Jul 20 - Jul 2	Thunder Bay	Jun 1 - Jun
Coronto (Main) Jun 15 - Jun 15 Surlington (Skyway) Coronto (Highland Creek)* Jun 29 - Jul Jun 29 - Jul Jun 29 - Jul Jun 29 - Jul Jun 20 - Jun Jun 2	Toronto (North)	Jun 8 - Jun 1
Jun 22 - Jun 22 Jun 22 Jun 23 Jun 22 - Jun 24 Jun 22 - Jun 25 Jun 29 - Jul 26 Jun 29 - Jul 27 Jun 29 - Jul 28 Jun 29 - Jul 29 Jul 29 - Jul 29 Jul 20 J	Dakville (SE)	Jun 8 - Jun 1
Surlington (Skyway) Jun 22 - Jun 2 Coronto (Highland Creek)* Jun 29 - Jul Samilton (Woodward) Jun 29 - Jul Sondon (Greenway) Jul 6 - Jul 1 Sondon (Pottersburg) Jul 6 - Jul 1 Grantford Jul 6 - Jul 1 Sississauga (Lakeview) Jul 13 - Jul 1 Saterloo Jul 20 - Jul 2 Sttawa (Green Creek)* Jul 20 - Jul 2 Coronto (Humber) Jul 20 - Jul 2	Toronto (Main)	Jun 15 - Jun 1
Coronto (Highland Creek)* Jun 29 - Jul Jun 29 - Jul Jun 29 - Jul Jun 29 - Jul Jun 29 - Jul Jun 29 - Jul Jul 6 - Jul Jun 29 - Jul Jul 6 - Jul Jun 29 - Jul Jul Jul 6 - Jul Jul Jul 6 - Jul Jul Jul 13 - Jul Jul Jul 20 - Jul Jul Sttawa (Green Creek)* Jul 20 - Jul Jun 20 - Jul Jul Jun 20 - Jul Jul	Mississauga (Clarkson)*	Jun 22 - Jun 2
Jun 29 - Jul Jun 29 - Jul Jun 20 - Jul	Burlington (Skyway)	Jun 22 - Jun 2
Jul 6 - Jul 1 Jul 13 - Jul 1 Jul 20 - Jul 2 Jul 20 - Jul	Coronto (Highland Creek)*	Jun 29 - Jul
Jul 6 - Jul 1 Grantford Jul 6 - Jul 1 Jul 3 - Jul 1 Jul 20 - Jul 2 Staterloo Jul 20 - Jul 2 Statawa (Green Creek)* Jul 20 - Jul 2 Joronto (Humber) Jul 20 - Jul 2	Hamilton (Woodward)	Jun 29 - Jul
Jul 6 - Jul 1 Jul 13 - Jul 1 Jul 20 - Jul 2 Jul 2	London (Greenway)	Jul 6 - Jul 1
Jul 13 - Jul 13 Jul 20 - Jul 20 J	London (Pottersburg)	Jul 6 - Jul 1
Jul 20 - Jul 2 Ottawa (Green Creek)* Jul 20 - Jul 2 Jul 20 - Jul 2 Jul 20 - Jul 2	Brantford	Jul 6 - Jul 1
oronto (Humber) Jul 20 - Jul 2 Jul 20 - Jul 2 Jul 20 - Jul 2	Mississauga (Lakeview)	Jul 13 - Jul 1
Oronto (Humber) Jul 20 - Jul 2	<i>l</i> aterloo	Jul 20 - Jul 2
	Ottawa (Green Creek)*	Jul 20 - Jul 2
itchener* Jul 20 - Jul 2	Coronto (Humber)	Jul 20 - Jul 2
	itchener*	Jul 20 - Jul 2

^{*} Plants sampled for 7 days

The evaluation of the sampling site involved the selection of suitable locations for the sampling equipment and identification and resolution of sampling difficulties. The plant flow monitoring equipment (sewage and sludge meters) were reviewed to assess the equipment accuracy and the ability to flow proportion samples. In addition, the monitoring program was discussed with the plant staff for the purpose of locating field team equipment (refrigerators, monitoring equipment, etc.) and to ensure a full understanding of project requirements.

During the initial visit, arrangements were made to obtain historical performance data for each plant, plant operating record sheets, and plant design reports.

2.3.3 Background Monitoring

In order to ensure that the HC data obtained at the plants would be collected under conditions that were representative of typical plant operation, a two-week presampling process monitoring period was established. After the initial site visit, any limitations in the routine monitoring program were identified. Supplemental monitoring requirements were then determined for any additional process information for the two weeks prior to the sampling period.

In order to define plant performance during the premonitoring period, data was collected for influent and effluent conventional contaminants (BOD $_5$, TSS, TP, TKN, NH $_3$ -N). At some plants, these parameters were not routinely monitored. It was therefore arranged that a sample be collected by WPCP staff at least once per week and submitted to MOE for analysis.

All of the available performance monitoring information was summarized on a spreadsheet. Figure 2-2 presents an example spreadsheet and shows monitored and derived data.

In certain instances, additional data not routinely collected was obtained by plant staff during the pre-monitoring and sampling period. This information included waste sludge rates, phosphorus removal chemical dosage, raw sludge volumes, digested sludge volumes, etc. The operation of the plant was evaluated for the study period based on discussions with plant operating staff, the background data and all pre-monitoring data.

2.3.4 Sampling Methodologies

2.3.4.1 Sampling Locations

Table 2-7 presents a summary of the sampling locations at each plant.

Figure 2-2 EXAMPLE OPERATIONAL EVALUATION SPREADSHEET

OPERALIDNAL EVALUATION FOR: "EIAM

"EIARPLE" MPCP

TREATMENT FACILITY: Secondary
PERIOD ENDING: Feb. 20, 1987
SAMPLING SEASON; Minter (Cold Weather)
0ESIGN AVE FLOW: 36,320 a3/d

			PRE-SA	PRE-SAMPLING PER100	100					PRE	PRE-SARPLING PERIDO	00183					SAMP	SAMPLING PERIOD	_	
PARANE TER	: 0AY I	: 0AY 2	0 ar 3 ;	ORY 3 : ORY 4 : DAY 5	DAY S	0 h v d	DAY 7 ::	0 44 8	1 DAY 9	1 044 10	10 1 OAY 11	: DAY 12	: 0AY 13	: 0AY 14	OHY : OHY 2 OHY 3 OHY 4 DHY 5 OHY 6 DHY 7 : OHY 8 OHY 9 OHY 11 OHY 12 OHY 13 OHY 14 OHY 15 DHY 14	: Day 16 :	0AY 17 :	: DAY 18 :	DAY 19 : DAY	20 DAY 21
TAN SENAGE FLOW	43,500	40,800 1	36,300 :	35,400	35,800	39,000	1 41,700	 34,00	06'96'	34,00	0 34,000	1, 41,700	31,300	27,600	13,400 13,800 19,000 41,700 : 34,000 34,800 34,000 41,700 31,300 27,401 : 27,400 : 28,100	28,100		28,100 ; 29,500 ;	29,000 :	
L of Design Flow	119.711		•				114.911		•		-	1: 114.817:	8	1: 75.991	22	7.371		81.221		
Influent 800 (eg/L)	171.0	210.01	164.0	0.69.1	113.0		124.0 ; 140.0 ;			148.0 107.0	0 : 172.0 :	226.0	ຸ ≅	0.0	173.0	159.0	125.0	219.0	107.0	<u> </u>
rimery boo tag/Li secondary BOD (ag/Li pRIMARY REMOVAL		5.0	5.0	1.0	9.	3.0	3.0.2		7.0 : 6.		4.0 ; 3.0 ;		0;	21.0	27.0	27.0	27.0	3.0	28.0 ;	
SECONDARY REMOVAL	95.3	97.6	97.0	92.6	•					95.9 : 96.3	5	11 97.8	98.3	85.5		1 83.0 1	78.4	9.86	73.8	
Influent SS (mg/L)	244.0		192.0	_	131.0	130.0	182.0 1:	171.0	_	174.0 128.0	0 : 172.0	228.0	216.0	214.0	135.0	140.0	124.0	217.0	106.0	
Secondary SS (eq/L)		7.0	8.0	13.0 :	11.0	7.0	9.0	16.01		12.0 : 11.0 :		14.0	7.0	16.0	•••	9.0	9.0	16.0	6.0	
SECONDARY RENDVAL	45.5		45.8	93.2	92.7 :	45.3	6	90.6		93.1	95.3	93.9	9.9	92.5	42.6	*	92.7	92.6	41.5	
nfluent WH4 leg/LJ	14.2	12.8					5.4		6.8	9.9	-	-	_		15.7	18.5	-			
Secondary NH4 (eg/L)	0:	9.6					7	8.								2.0				
I PRIMANT MEMUNAL SECONDARY REMOVAL	43.2						75.9	88		79.4					87.8					
influent Trm leg/Ll	25.3	23.2					= = =	4.0 11 11.7		12.2	<u> </u>	<u> </u>		ļ	27.6	32.6	<u> </u>		<u>.</u>	<u> </u>
Friedry 1xx 1mg/L1 Secondary 1xx (mg/L1 7 PRIMARY REMOVAL	2.4	2.4					2		2.6 : 1.						0.6	14.3				
SECONDARY REMOVAL	40.5	1.68		-			90.7 11	0.7 11 77.8		· <u>-</u> -					67.41	54.1				
Influent fotal P tag/Li	9.40		9.	3.10	99.	€.00	3.70	4.60		5.00 4.30	5.50	9	8.30	5.10	7.40	6.20	3.20	7.20	6.40	
Secondary Total P 189/L)	0.50	6.19	0.34	0.42	9. 6	0.30	0.32	05.1	. 0.38		0.34	0.64	0.51	01.1	0.80	0.49	0.37	0.35	0.45	
SECONDARY REMOUN	60	6 46	42.4	81.6	0.09	97.5						43.0		200		8 0	9.00		9 10	

Table 2-7 SUMMARY OF SAMPLING LOCATIONS AT THE STUDY WPCP'S

				Number of	of Sampling Locations	tions	
Plant	Raw Sewage	Primary Effluent	Secondary	Tertiary Effluent	Raw Sludge	Waste (Treated) Sludge	Recycle to Raw Sewage Stream
Tertiary							
Guelph	1	t	1	1	1	AND/DW-1	ı
Secondary							
Belle River (Maidstone)	7	1	1	1	1	AD-1	ı
Brantford	1	ı	1	ı	2	AND-1	1
Burlington (Skyway)	1	ı	1	ı	1	AND-1	•
Grimsby (Baker Road)	Т	1	7	ı	1	AND-1	ı
Hamilton	1	,	1	1	7	AND/DW-1	1
Kingston TWP	1	ı	1	ı	1	AND-1	1
Kitchener	1	1	1	ı	1	AND-1	•
London (Greenway)	-	ı	1	ı	WAS-1/PRIM-1	DW-1	ı
London (Pottersburg)	1	1	1	1	1	ı	1
Mississauga (Clarkson)	1	ı	1	ı	2	COTH/AND-1	1
Mississauga (Lakeview)	7	ı	ю	ı	ı	DW/BL/TC-1	ı
							•
Moore (Corunna)	1	ı	7	ı	1 (RAS)	HT-1	1
Niagara Falls (Stamford)	1	ı	.7	ı	1 (PRIM) 1 (RBC)	AND-1	
Oakville (SE)	1	ı	1	ı	7	AND-1	,
Paris	1	1	1	ı	٦	AD/TH/HT-1	1
Peterborough	7	1	7	ı	1	AND-1	ı
Pickering (Duffin Creek)	1	1	1	ı	1	AND/DW-1	1
Sault Ste. Marie (West)	7	t	ı	ι	1	HT/DW-1	1
_	- Anaerobically Digested	Digested			1	Thermally Conditioned	
1	Aerobically Digested	gested			1		
1	red				1	g Tank	- Supernatant Decanted
ı	rated				ı	ınd	
1 H	ckened i	Co-thickened in Primary Clarifiers	larifiers		ı	Return Activated Sludge	
HI - HEAT THO - Therma	meat Treated Thermally Oxidated	ated			RBC - Rota	Primary Siudge Rotating Biological Contacter Sludge	acter Sludge
ı	Activate	udge	- no treatment	nt	1	Heat Treatment	

le 2	Continued

Sudbury Sudbury Sudbury Sudbury Sudbury Sudbury Sudbury Sudbury Sudbury Toronto (Highland Creek)	Waste (Treated)	Re
and Creek) 1	Sludge	Stream
and Creek) 1 - 1 - 1 PRIM-J/TH-1	HT-1	ı
	COTH/AND/GR/HEAT/DW-1	
3	TH/AND-1	2
1	TH/AND/THO/DW-1	1
1	AND/DW-1	1
Urgg 1	AND-2	1
2 - 1 - 1 1 - 1 1 2 1 1 1 2 1 1 1 3 1 1 1 4 1 1 1 5 1 1 1 7 1 8 1 1 1 8 1	AND/DW-1	1
1	AND-1	1
	DW-1	1
1		
1	AND/DW-1	ı
1	AND-1	1
1	AND-1	2
1 1 2 2 2 3 4 4 4 4 4 4 4 4 4	AND-1	1
1	1 1	
Anaerobically Digested Aerobically Digested TC - Dewatered TH - Droinerated Co-thickened in Primary Clarifiers FRIM - FRIM -	AND=1	,
Anaerobically Digested Aerobically Digested TC - Dewatered TH - Devatered TH - TC - TH - TC - TH - TH - TC - TH - TE	DE-1	,
1 2	ראבו	4
1 2		
Anaerobically Digested TC - Dewatered TH - HT - Horinerated GR - Co-thickened in Primary Clarifiers RAS - Heat Treated PRIM -	ı	1
: AND - Anaerobically Digested AD - Aerobically Digested DW - Dewatered INC - Incherated COTH - Co-thickened in Primary Clarifiers HT - RAS - HT - Heat Treated	1	1
: AND - Anaerobically Digested AD - Aexobically Digested DW - Dewatered INC - Incinerated COTH - Co-thickened in Primary Clarifiers HT - Heat Treated	;	
- Aerobically Digested - Dewatered - Incinerated - Co-thickened in Primary Clarifiers - Heat Treated - PRIM -	Thermally Conditioned	
- Dewatered - Incinerated - Co-thickened in Primary Clarifiers - Heat Treated - PRIM -		
- Incinerated - Co-thickened in Primary Clarifiers RAS - - Heat Treated PRIM -	g Tank -	supernatant Decanted
- Co-thickened in Primary Clarifiers RAS - - Heat Treated PRIM -	onno	
- Heat Treated PRIM -	Return Activated Sludge	ge
700	Primary Sludge	
710 - Thermally Oxidated WAS - Waste Activated Sludge - no treatment HEAT - Heat Trea	kotating biological contacter sludge Heat Treatment	ontacter sludg

(KIRIR/282W)

In general, raw sewage was sampled at a point at, or past, the grit removal area which provided good mixing characteristics. If there was aeration at the grit removal area, samples for volatile organic compounds only were collected upstream of this point.

At nine plants it was not possible to obtain a raw sewage sample at a point in the plant before an internal recycle (eg. digester supernatant, waste activated sludge etc.) entered the stream. In these cases, it was also necessary to collect a recycle stream sample so that the recycle contribution to the combined stream in terms of flows and contaminants, could be subtracted to obtain the actual raw wastewater characteristics.

Final effluent streams at all WPCPs except Mississauga (Lakeview) were sampled at a point beyond the point of chlorine addition. Due to logistics, at Lakeview, the effluent sample was taken prior to chlorination and manually chlorinated by the sampling team (subsection 2.3.4.3).

Sampling of raw sludges took place at one or more locations at each plant, depending on the configuration. Samples were only taken during operation of the sludge pumps. Typically, the treatment plants had multiple sumps from where raw sludge could be drawn. In the more complex cases, it was not practical to sample all of the locations each day. In these cases, a sample routine was determined which would allow all locations to be sampled on a regular basis over the 5 day study period. If waste activated sludge was sampled as a separate component of the raw sludge sample it was aliquoted on a flow weighted basis.

Treated sludges were either digested or digested and dewatered. For digested sludges, samples were taken from each digester in service and composited into one treated sludge sample. In plants with dewatering operations, the sludge cake was sampled.

2.3.4.2 Sample Collection Procedures

Raw sewage, final effluent (primary, secondary, lagoon and tertiary) and recycle streams were collected using the following methods:

Sampling Method	Analyses
24-hour flow proportioned composites	Conventionals, metals, cyanide, base-neutral and acid extractable compounds and pesticides and herbicides
5-day composite samples	Dioxin-furan compounds
Grab samples (3 per 24 hours)	Volatile organic compounds

The 24-hour flow proportioned composite samples were collected using one of three techniques, depending on the logistics of the sampling point. These included:

- o Automatic samplers withdrew one individual aliquot each hour. All of the aliquots were manually composited on a flow-proportioned basis at the end of each 24-hour period.
- o Automatic samplers were interfaced with the plant flow recorders so that flow weighted hourly aliquot volumes were added directly into one composite container.
- o Hourly aliquots were grab sampled and composited manually on a flow proportioned basis at the end of each 24-hour period.

For dioxin/furan analyses, flow proportioned aliquots were collected 3 times each day at least 2 hours apart and combined to form 5 day composite samples. Each aliquot was poured directly into the 5-day composite container.

Grab samples for volatile organic compound analyses were collected 3 times per day at least 2 hours apart. The equal volume samples were combined into daily composite samples at the analytical laboratory.

Raw and treated sludge samples collected for all analyses were 5-day flow proportioned composite samples. A minimum of three grab aliquots were collected each day, at least 2 hours apart. There were two methods of making up sludge samples as follows:

- o Individual aliquots were stored separately and combined flow proportionally at the end of the 5-day period to form one 5-day composite sample.
- o Individual flow proportioned aliquots were added directly to the 5-day composite container. This method was only used if the sludge flow was reasonably constant from day to day.

2.3.4.3 <u>Sampling Handling Procotol</u>

In order to ensure the integrity of sample results, a number of cleanliness, security and preservation procedures were carried out in the field.

All of the field equipment coming into contact with the sample was washed with methanol and rinsed with organic free distilled water prior to sampling. When sampling liquid streams, the equipment was also pre-rinsed with the stream

before the sample was taken. Equipment material was either glass, stainless steel, teflon or surgical graded silicon rubber. All equipment was site specific.

For security against breakages in transport or at the laboratory, all samples were collected in duplicate.

Tables 2-8 and 2-9 present the preservation methods used for liquid and sludge samples respectively. In addition to bottle specific preservation methods dependent on the nature of the analyses, all bottles were stored at 4°C in the field and during transport.

Table 2-8
INFLUENT, EFFLUENT AND RECYCLE SAMPLE PRESERVATION

Sample Group	Analysis	# of Samples	Bottle(2)	Preservation(1)
24 hr composite (Automatic or	Base Neutral and Acid Extractable	2/đay	1L (3P)	4°C
manual)	Pesticides/Herbicides	2/day	1L (3P)	4°C
	ICAP	2/day	500 mL (20)	HNO ₃ + 4°C
	Mercury	2/đay	250 mL (8c)	$HNO_3 + K_2CrO_7 + 4°C$
	Conventionals	2/day	1 L (3)	4°C
	Phenolics	2/day	250 mL (8p)	CuSO ₄ + H ₂ PO ₄ + 4°C
	Cyanide	2/day	500 mL (20)	NaOH + 4°C
5 day composite	Dioxins/Furans	2/wk	1L (3p)	4°C
Grabs ·	Volatile Organics	6/day	50 mL vials	4°C

Notes: (1) Sodium Thiosulphate was added to all effluent samples

(2) MOE bottle description code

Table 2-9
SLUDGE SAMPLE COLLECTION AND PREPARATION

Sample Type	Analysis	# of Samples	Bottle*	Preservation
Sludges (Raw & Treated)	Volatile Organics	2/wk	250 mL (5p)	Methanol 4°C
lieated)	Base Neutral & Acid Extractable	2/wk	250 mL (5p)	4°C
	Pesticides & Herbicides	2/wk	250 mL (5p)	4°C
	Dioxins/Furans	2/wk	250 mL (20)	4°C
	ICAP, Mercury, Cyanide	2/wk	500 mL (20)	4°C
	Conventionals	2/wk	250 mL (5)	4°C
	Phenolics	2/wk	250 mL (5)	4°C

^{* -} MOE Bottle Description Code

In addition to the above procedures, sodium thiosulphate $(Na_2S_2O_3)$ was added to all final effluent samples to neutralize the chlorine residual. The sodium thiosulphate was added to final effluent sample containers prior to sampling each day.

At one plant (Mississauga (Lakeview)), it was not possible to obtain a chlorinated effluent sample, and non-chlorinated effluent was sampled. In this particular case, the sample was dosed with a concentrated sodium hypochlorite solution to provide a chlorine concentration in the sample equal to the concentration in the chlorinated plant effluent, and mixed slowly for a time equal to the contact time at the plant. The sample was subsequently neutralized with sodium thiosulphate.

2.3.5 Documentation of Field Program

Field sampling personnel were responsible for maintaining two types of records:

- o Process information
- o Sample submissions

Any process information that related to sampled streams was recorded daily. Also, a wide range of sample submission information was recorded in field logs. Records maintained at each treatment plant depended on the type of processes being sampled. A list of typical field record information documented for each sample stream is listed in Table 2-10.

Table 2-10 FIELD RECORD INFORMATION

Information			Stream		
	Influent	Effluent	Recycle	Raw Sludge	Treated Sludge
Hourly Flows	x	X	х		
Daily Flows	х	Х	Х	Х	Х
Pump Times			Х	Х	Х
Pump Volumes				Х	X
Cl, Contact Times		Х			
Sample Volume	Х	Х	X		
Sample Time	х	Х	Х	Х	Х
Sample Location	Х	Х	Х	Х	X
Sample Weight				Х	Х
Preservation	Х	Х	Х	Х	Х
Sample Loss	х	х	Х	X	X
Process Irregularity	X	Х	х	Х	Х
Sampler Configuration	Х	Х	Х		
QA/QC Samples	Х	Х	Х	X	Х
Samples Submitted	Х	Х	Х	Х	Х

2.3.6 Field QA/QC Program

The field QA/QC program involved the collection of field blanks. A field blank was an organic free distilled water sample that underwent the same handling in the field and the laboratory as the samples. The purpose of the field blank collection and subsequent analysis was to establish if contamination was being introduced into the samples from the sampling equipment or preservation methods, transportation and/or laboratory handling. In order to determine the sources of contamination, if any, it was necessary to compare field blank results with the laboratory method blank results.

A "grab" sample field blank was prepared by rinsing organic free water in the grab sampling container prior to sampling. The rinse water was placed in the sample bottle and preserved using methods appropriate for the compounds to be analyzed (see Table 2-8).

An automatic sampler field blank was prepared from organic free water which was pumped through the sampler tubing prior to sampling. As above, the water was bottled and preserved according to prescribed methods (Table 2-8).

During the entire program, a total of 19 field blank samples were collected.

In addition to the field QA/QC program, a number of laboratory QA/QC measures were taken; some requiring duplicate sample collection in the field. The laboratory QA/QC procedures are described in Section 3.0.

3.0 ANALYTICAL METHODOLOGY

3.1 Laboratory Analyses

Three laboratories were contracted by MOE to carry out the organics analyses on the samples from the 37 WPCPs. Zenon Environmental Incorporated in Burlington, Ontario did all of the analyses for the volatile organic compounds, dioxin/furan compounds and total phenols. The base neutral and acid extractable compounds were analyzed by Mann Testing Laboratories Ltd., in Mississauga, Ontario and the pesticides and herbicides analyses were carried out in the laboratories of Enviroclean Ltd., in London, Ontario.

In addition, the MOE Laboratory Services Branch (LSB) in Rexdale carried out the analyses for metals, conventional contaminants and cyanide. Table 3-1 presents a complete list of parameters analyzed by each analytical laboratory.

Table 3-2 presents the methods used by the laboratories for analysis of organic compounds and metals. A detailed description of these methods can be found in the individual laboratory reports, summarized by Zenon (Ref. 4). Table 3-3 presents the methods used to analyze the conventional contaminants.

3.2 <u>Laboratory QA/QC Procedures For Trace Organic Compounds</u>

A number of different techniques were regularly used in the laboratory for quality assurance of the analytical results. In addition to these methods, MOE Laboratory Services conducted an external quality assurance program. The quality assurance/quality control methods are presented in the following discussion.

Method Blanks

A method blank was analyzed routinely along with each batch of samples to identify possible contamination contributed by glassware, reagents, other samples, etc. A method blank consisted of an uncontaminated distilled water sample that underwent identical preparation methods (eg. extraction, purge and trap) and was analyzed with the field samples. A method blank was analyzed each time the instrumentation was set up for a new batch of samples.

The method blank analyses were used for two main purposes. Each day of analyses, method blank concentrations of each contaminant were averaged for all of the blanks analyzed that day. The average value was used to correct the concentrations of the particular contaminant in the samples on

ing Enviroclean Ltd.	Modes 2,4-Trichlorobenzene 2,4,5-Trichlorobenzene 2,4,5-Trichlorobenzene 2,4,5-Trichlorobenzene 2,4,5-Trichlorobenzene 2,4,5-Trichlorobenzene 2,4-Dichlorophenoxyacetic 2,4-Dichlorop
ntal Mann Testing Laboratories Ltd	prounds Extractable Compounds ethane 2,4,5-Trichlorophenol 2,4-Dimetrolorophenol 2,4-Dimetrolorophenol 2,4-Dimitrolorophenol 3,4-Dimitrolorophenol 2,4-Dimitrolorophenol 2,4-Dimitrolorophenol 3,4-Dimitrolorophenol 4-Dimitrolorophenol 5,4-Dimitrolorophenol 5,4-Dimitrolorophenol 6-Dimitrolorophenol 6-Dimitroloro
Zenon Environmental Incorporated	Volatile Organic Compounds 1, 1, 2.7 Trichloroethane 1, 1, 2.1 Trichloroethane 1, 2.0 ichlorobenzene 1, 3.0 ichlorobenzene 1, 4.0 ichlorobenzene 1, 4.0 ichlorobenzene 2.0 ichloroethane 3.0 ichloroethane Benzene Benzene Benzene Bromodichloromethane Bromodichloromethane Bromodichloromethane Bromodichloromethane Bromodichloromethane Bromodichloromethane Bromodichloromethane Bromodichloromethane Chloroethane Dichloroethane Dichloroethane Dichloroethane Chloroethane
MOE Laboratory Services Branch	Metals and Cyanide (Untiltered, Total) Aluminum Beryllium Cadmium Cadmium Chromium Cobper Iron Cobper Iron Magnesium Mickel Salon Silver Conventional Contaminants Alkalinity Ankalinity Ankalinity Ankalinity Ankalinity Ankalinity Ankalinity Ankalinity Ankalinity Ankalinity Antonium Zinc Cyanide Nirrite Nitrogen Nirrite Nitrogen Total Myedhal Nitrogen Total Myedhal Nitrogen Total Myedhal Nitrogen Total Myedhal Nitrogen Total Solids Total Solids Turbidity Volatile Suspended Solids Volatile Suspended Solids

	Analytical Laboratory	Zenon Environmental Inc.	Zenon Environmental Inc.	Zenon Environmental Inc.	Mann Testing Laboratories Ltd.	Mann Testing Laboratories Ltd.	Enviroclean Ltd.	Enviroclean Ltd.	MOE LSB
ETALS USED IN THE STUDY	Instrumentation	NUTECH 8522 with Finnigan 4510 GCMS with Incos Data System Enviroclean Series 810 and Hewlett Packard (HP) Mass Selective Detector (MSD)	Finnigan 4510 GC/MS with Incos Data System		HP5970 B Mass Selective Detector HP5890 Gas Chromatograph HP9816 Computer System	HP5970 B Mass Selective detector HP5890 Gas Chromatograph HP9816 Computer System	Varian 6000 GC	Hewlett Packard 5890	
Table 3-2 SUMMARY OF ANALYTICAL METHODS FOR TRACE ORGANICS AND METALS USED IN THE STUDY	Analytical Method	Gas Chromatography Mass Spectrometry (GC/MS) Capillary Column	GC/MS Capillary Column	Direct photometric method	GC/MS Capillary column	GC/MS Capillary column	GC/MS Dual Capillary Column	GC/MS Dual Capillary Column	Inductively Coupled Plasma Spectrometry (ICP) Direct Coupled Plasma Spectrometry (DCP)
SUMMARY OF ANALYTICAL ME	Sample Prepration Method	Purge and trap	Liquid/liquid extraction and cleanup	Dilution (if necessary) and distillation from acidified sample	Liguid/liguid extraction and cleanup	Liquid/liquid extraction	Liquid/liquid extraction and cleanup	Liquid/liquid extraction and cleanup	
	Contaminant or Contaminant Group	Volatile Organic Compounds	PCDD/PCDF	Total Phenols	Acid Extractable Compounds	Base/Neutral Extractable Compounds	PCBs and Organochlorine Insecticides	Phenoxy Acid Herbicides	Metals (Ag, As, Cd, Cr, Co, Cu, Hg, Mo, Nl, Pb, Se, Zn, Al, Fe, Be, Ca, Mg)

Table 3-3
SUMMARY OF ANALYTICAL METHODS FOR CONVENTIONAL CONTAMINANTS
USED IN THE STUDY

Contaminant	Method	Reference*
рН	pH Electrode	Code 001 AIl page 249
Chemical Oxygen Demand (COD)	Colourimetric measurement of trivalent chromium	Code 525 1C2 page 237
Biochemical Oxygen Demand (BOD)	Five day incubation	Code 001 A12 page 234
Dissolved Organic Carbon (DOC)	Filtration glass fibre filter \le 2 µm, combustion at <1000°C, colourometric detection	Code 102 AC@ page 89
Ammonia plus Ammonium (NH ₃)	Distillation, colour-imetry	Code 103 DC2 page 191
Nitrate (NO ₃)	Colourimetry	Code 102 DC2 page 210
Nitrite (NO ₂)	Colourimetry	Code 102 DC2 page 222
Total Kjeldhal Nitrogen (TKN)	Digestion, distillation and colourimetry	Code 004 AC2 page 228
Total Solids (TS)	Drying at 103 °C ± 3°C and gravimetry	Code 202 A16 page 342
Total Suspended Solids (TSS)	Filtration glass fibre filter ≤ 2 µm, drying at 103 °C ± 3°C and gravimetry	Code 506 AD4 Page 348
Volatile Suspended Solids (VSS)	As above, ignite filter for 4 hours at 550°C	Code 506 AD4 page 348
Total Phosphorus (TP)	Digestion, colourimetry	Code 504 AC2 page 279

^{* &}quot;1986 Performance Report", Water Quality Section, Ministry of the Environment

that day. Secondly, the method blank results for all of the analyses were used to determine if the background "noise" level was too high to use the data for a particular contaminant with confidence.

Duplicates

Duplicate samples were defined as two aliquots taken from a single sample and carried through the same analytical process. The purpose of duplicate analyses was to provide a measure of analytical precision. This was carried out by comparing the differences of each set of duplicates, and determining if the differences were statistically significant.

Native Spikes in Distilled Water Samples

A known amount of standard mixture containing selected native compounds on the monitoring list (Table 2-2) was spiked into a reagent water sample, which subsequently underwent the same preparation and analysis as the field samples.

With each batch of samples analyzed, a blank was spiked with each of the compounds to be analyzed in the sample, and the percentage recovery was documented. The following 2 results were then used to evaluate the applicability of the data for each batch of samples:

- o The recovery of the native compound from the distilled water blank analyzed for each batch of samples.
- o The recovery of the spiked compound from all of the distilled water blanks for the entire study.

Surrogate Spikes in Field Samples

A known amount of mixture containing deuterated target compounds was spiked into the field sample, which was subsequently processed and analyzed. The amount of recovery of the deuterated spike was used to indicate the recovery of the target compound from the sample and the variability of compound recovery.

MOE Laboratory Spiking

Duplicate field samples were sent to the MOE LSB. Some liquid samples and all sludge samples were labelled at the MOE LSB, to indicate they were replicate samples, and were then taken to the contract laboratory for analyses. Other

samples were spiked at the MOE LSB with known concentrations of target compounds of volatiles, organics and pesticides. The spiked samples were relabelled for identification as a spiked replicate of the field sample and then submitted for analyses to the appropriate laboratory. The results of the spiked samples were compared to the replicate unspiked sample. The purpose of the MOE laboratory spiking was to ensure the integrity of the results if the concentrations of native compounds in spiked samples were greater than in non-spiked samples, and to establish parameter stability in transport, storage and analysis.

3.3 Data Management and Review

Analytical and QA/QC results from each of the contract laboratories and from MOE LSB were input into MOE Laboratory Information System (LIS). The results were reviewed and approved by the pertinent MOE laboratory supervisors. The approved results were then transferred from the mainframe LIS to a microcomputer database at MOE using dBase III Plus software (Ashton-Tate) for ease in data analysis and reporting.

The finalized database was sent to CANVIRO for formatting, analysis, interpretation and summarizing.

4.1 Background

Ideally, to effectively characterize wastewater treatment plant influents, effluents, sludges, removal abilities and drainage basin loadings in terms of HCs for Ontario WPCPs, all plants in Ontario would undergo the monitoring program. Since economic and time constraints would not allow for this, it was necessary to select a smaller group of plants that would be representative of all of the Ontario plants.

4.1.1 Ontario WPCPs

In 1987 in Ontario, there were 412 municipal treatment facilities, treating wastewater at a rate of 5.0 million cubic metres per day for a population of over 7 million people.

The 412 treatment facilities had a total hydraulic design capacity of over 6.0 million cubic metres per day. Figure 4-1 shows that in 1987, 82 percent of the facilities in Ontario had design capacities of less than 10,000 m³/day and 36 percent of the 412 facilities were less than 1,000 m³/day. Only 6.8 percent of the plants (27 plants) had capacities greater than 45,000 m³/day but they contributed greater than 70 percent of the total flow in 1987.

Figure 4-2 shows that in 1987, 52 percent of the facilities in Ontario provided secondary treatment, 7.5 percent provided primary treatment, 39 percent were lagoons and 1.7 percent were facilities with no discharge to surface waters (ie. septic tanks, exfiltration plants). Secondary facilities in Ontario generated the largest portion (76.8 percent) of flow in 1987; 70 percent of which was contributed by conventional activated sludge plants. Lagoons and septic tanks typically serve smaller communities. Consequently, total flow contribution from these types of facilities was less than 2 percent.

The 412 facilities in Ontario are located throughout the Province. Larger facilities are primarily located in the Lake Ontario drainage basin, accounting for 58.4 percent of the total flow (based on 1987 flow) from Ontario plants. Lake Erie and Lake Huron received 17.2 and 7.3 percent respectively. The Ottawa River and St. Lawrence River drainage basins received a total of 13.6 percent and flow into Lake Superior, James Bay and Lake Winnipeg was 3.5 percent.

4.1.2 <u>37 WPCPs in the Study</u>

The total flows in 1987 at the 37 WPCPs was 3.7 million cubic metres per day, or 73.6 of the total Ontario flow for that year. Of the study plants, secondary treatment facil-

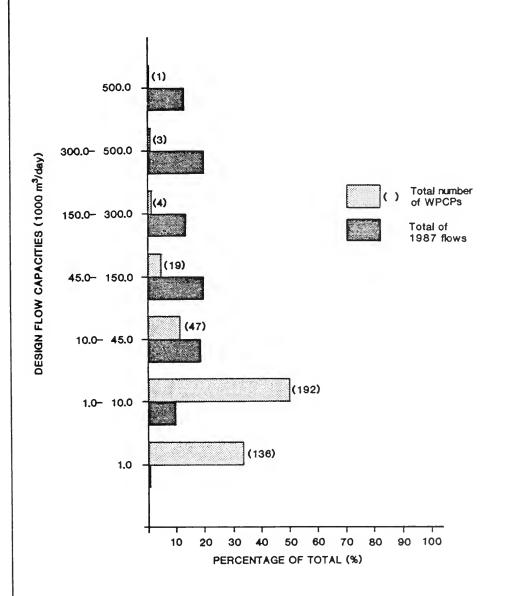
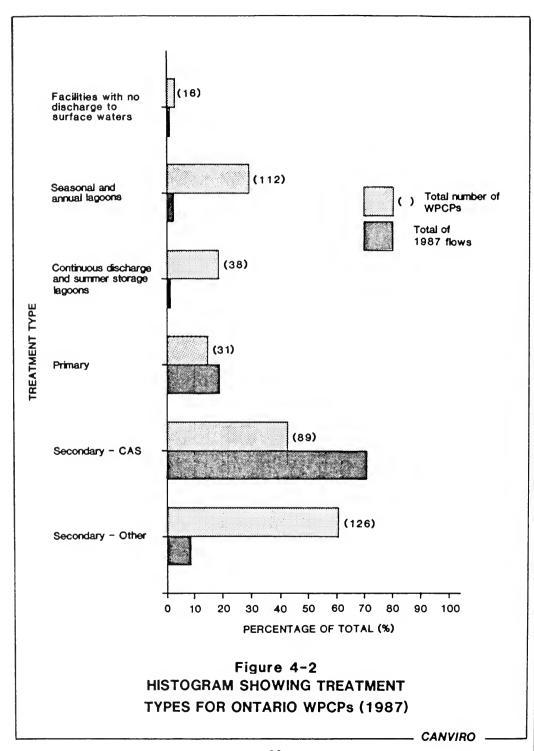


Figure 4-1
HISTOGRAM SHOWING DESIGN FLOW CAPACITIES
FOR ONTARIO WPCPs (1987)



ities contributed to 77.9 percent of flows, primary facilities contributed to 21.6 percent and lagoons to 0.5 percent of these flows.

There were 28 secondary treatment plants involved in the study, comprising 76 percent of the 37 plants. Of these, 23 were conventional activated sludge plants (1 with tertiary treatment), 3 were extended aeration, one was high rate and one used rotating biological contactors.

The largest portion of flows from the selected WPCPs were to the Lake Ontario drainage basin, comprising 64.5 percent. Flows to the Lake Erie drainage basin comprised 16.5 percent, to Lake Huron comprised 2.4 percent and to Lake Superior, 2.2 percent. The Ottawa River and St. Lawrence drainage basins received 14.4 percent of the total flow from the 37 WPCPs.

4.1.3 Comparison Between Ontario WPCPs and 37 WPCPs Selected For Study

The histograms in Figure 4-3 present a comparison of the 37 plants selected for the study to Ontario WPCPs. As noted previously, the study WPCPs represented more than 70 percent of flows from all plants in Ontario in 1987 (Figure 4-3a). The quantities of flows from each type of treatment process (ie. secondary, primary and lagoons) for the study WPCPs are of similar proportions to those for all Ontario WPCPs (Figure 4-3b). In addition, the division of the total Ontario flows to each drainage basin is also represented fairly accurately by the study WPCPs (Figure 4-3d).

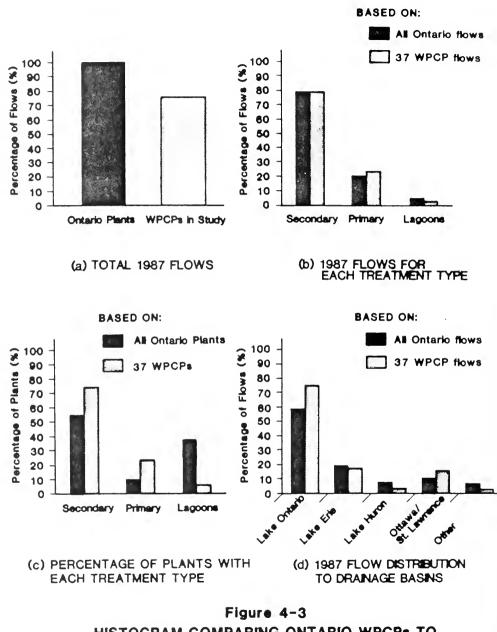
Figure 4-3c shows that a larger percentage of secondary treatment facilities were represented in the study than those existing in Ontario. Since one objective of the present study was to estimate the concentrations and/or removals of HCs in secondary WPCPs, a larger proportion of secondary plants was selected.

In summary, it can be observed that the study group of treatment facilities are a representative portion of all Ontario plants.

4.2 Characteristics of 37 WPCPS in Study

4.2.1 <u>Summary of Communities</u>

Table 4-1 presents a summary of the characteristics of the communities served by each of the study WPCPs.



HISTOGRAM COMPARING ONTARIO WPCPs TO WPCPs SELECTED FOR THE STUDY

CANVIRO

Table 4-1 SUMMARY OF COMMUNITIES OF 37 WPCPs

Plant	Population Served	Receiving Watercourse	Drainage Basin	% Industrial Flow
Guelph	82,000	Grand River	Lake Erie	25%
Belle River (Maidstone)	7,581	Lake St. Clair	Lake Erie	8%
Brantford	73,000	Grand River	Lake Erie	40%
Burlington (Skyway)	120,000	Hamilton Harbour	Lake Ontario	17%
Grimsby (Baker Rd.)	19,850	Lake Ontario	Lake Ontario	0%
Hamilton (Woodward)	300,000	Redhill Creek	Lake Ontario	10%
Kingston TWP	18,700	Lake Ontario	Lake Ontario	4%
Kitchener	138,271	Grand River	Lake Erie	39%
London (Greenway)	164,614	Thames River	Lake Erie	8%
London (Pottersburg)	25,979	Thames River	Lake Erie	9%
Mississauga (Clarkson)	120,000	Lake Ontario	Lake Ontario	25%
Mississauga (Lakeview)	370,000	Lake Ontario	Lake Ontario	12%
Moore (Corunna)	3,405	St. Clair River	Lake Erie	<1%
Oakville (S.E.)	21,900	Lake Ontario	Lake Ontario	<1%
Niagara Falls (Stamford)	67,835	Chippawa Power Canal	Lake Ontario	18%
Paris	4,359	Grand River	Lake Erie	32%
Peterborough	61,063	Otonabee River	Lake Ontario	22%
Pickering (Duffin Creek)	64,386	Lake Ontario	Lake Ontario	25%
Sault Ste. Marie (West)		St. Mary's River	Lake Huron	-
Sudbury	95,000	Junction Creek	Lake Huron	1%
Toronto (Highland Creek)	290,000	Lake Ontario	Lake Ontario	22%
Toronto (Humber)	660,000	Lake Ontario	Lake Ontario	19%
Toronto (Main)	1,200,000	Lake Ontario	Lake Ontario	8%
Toronto (North)	55,000	Don River	Lake Ontario	8%
Waterloo	66,627	Grand River	Lake Erie	13%
Wallaceburg	9,200	Sydenham River	Lake Erie	37%
Whitby (Pringle Ck #1)	10,925	Pringle Creek	Lake Ontario	22%
Windsor (Little River)	64,000	Little River	Lake Erie	24%
Cornwall	46,800	St. Lawrence River	St. Lawrence River	10%
Kingston (City)	67,000	St. Lawrence River	St. Lawrence River	2%
Ottawa (Green Creek)	450,000	Ottawa River	Ottawa River	3%
Sarnia	64,475	St. Clair River	Lake Erie	7%
Sault Ste. Marie (East)	75,000	St. Mary's River	Lake Huron	26%
Thunder Bay	101,529	Kaministikwia River	Lake Superior	9%
Windsor (Westerly)	123,000	Detroit River	Lake Erie	28%
Lindsay	14,636	Scugog River	Lake Ontario	19%
Niagara-on-the-Lake	5,210	Lake Ontario	Lake Ontario	25%

The population of the communities (based on 1987 MOE data) served by the WPCPs range from under 5,000 for Moore (Corunna) and Paris to cities of greater than 100,000 (Burlington, Hamilton, London, Mississauga, Toronto, Thunder Bay, and Windsor).

The receiving water courses for the plants depend on the geographic location of the communities being served. Typically, the receiving water course is a creek or river that is a tributary of one of the Great Lakes. Only 10 plants discharge directly into the major drainage basin of Lake Ontario (3 Toronto plants, 2 Mississauga plants, Pickering, Grimsby, Kingston, Niagara-on-the-Lake and Oakville), and one plant into the St. Lawrence River (Cornwall).

The industrial flow contributions to the study WPCPs range from less than 1 percent for Grimsby (Baker Road) WPCP, Oakville S.E. WPCP and Moore (Corunna) WPCP to about 40 percent for a number of WPCPs. The industrial flow data was taken from a separate MOE study. Municipalities were requested to provide MOE with annual water use data for the industries that discharged to the 37 WPCPs. Industrial flow into each WPCP was then estimated as 85 percent of the total annual water use for 250 days per year. Since annual water use data were not available for many industries, the industrial flow data percentages in Table 4-1 should be considered very approximate (Ref. 4).

4.2.2 Summary of WPCP Design Characteristics

A summary of the WPCP design characteristics, including flows, process type and sludge treatment and disposal methods is presented in Table 4-2.

Ten of the study plants have design flow capacities of greater than $100,000 \text{ m}^3/\text{d}$, $12 \text{ have capacities in the range of } 45,000-100,000 \text{ m}^3/\text{d}$, $9 \text{ are in the range of } 10,000-45,000 \text{ m}^3/\text{d}$, and $6 \text{ have design capacities of less than } 10,000 \text{ m}^3/\text{d}$.

The percentage utilization of the plant design capacity (based on 1987 average daily flows) ranged from 36% for the new Sault Ste. Marie (West) plant to plants operating at or beyond their hydraulic design capacities (Waterloo, Wallaceburg, Cornwall, Toronto (Humber) and Niagara-on-the-Lake).

All of the secondary plants with the exception of Hamilton (Woodward) and Sudbury practice continuous chemical addition for phosphorus removal. Woodward WPCP used the industrially contributed iron in the raw wastewater for phosphorus removal. Sudbury was not practicing phosphorus removal at the time of the study. However, phosphorus removal equipment is presently being installed. All of the primary plants, with the exception of the Sault Ste. Marie (East) plant, also had continuous addition of chemicals for phosphorus removal. Only Lindsay lagoon uses chemicals for phosphorus removal. The Niagara-onthe-Lake lagoon has no phosphorus removal facilities.

Table 4-2 SUMMARY OF WPCP DESIGN AND FLOW DATA

Plant	Design Flow Capacity (10 ³ m³/day)	1987 Average Flow (10 ³ m ³ /day)	1987 Flow as & of Design	Process	Phosphorus Removal	Sludge Treatment	Sludge Disposal
Tertiary Plants Guelph	54.55	43.42	79.6	Conventional activated sludge plus RBC's plus filtration	Continuous	Co-thickening/anaerobic digestion/filter dewater-	Drying beds or landfill
						ing	
Secondary Plants	6.87	2.60	82.1	Extended aeration	Continuous	Aerobic Digestion	Hauled
Brantford	81.83	52.10	63.7	Conventional activated sludge	Continuous	Co-thickening/anaerobic digestion	Agricultural land or lagoon
Burlington (Skyway)	93.19	67.03	71.9	Conventional activated sludge	Continuous	Co-thickening/anaerobic digestion	Incineration and/or agricultural land
Grimsby (Baker Road)	18.18	13.05	71.8	Conventional activated sludge	Continuous	Anaerobic digestion	Agricultural land
Hamilton (Woodward)	409,14	306.47	74.9	Conventional activated sludge	Without Chemicals	Co-thickening/anaerobic digestion/filter dewater-ing	Incineration
Kingston TWP	25.00	18.03	72.1	Conventional activated sludge	Continuous	Anaerobic digestion	Drying bed on lagoon
Kitchener	122.70	70.58	57.5	Conventional activated sludge	Continuous	Anaerobic digestion/	Agricultural land
London (Greenway)	122.70	110.8	90.3	Conventional activated sludge	Continuous	Dissolved air flotation/ belt press dewatering	Incineration
London (Pottersburg)	22.05	16.33	74.1	Conventional activated sludge	Continuous	Co-thickening/storage	Incineration
Mississauga (Clarkson)	109.10	74.7	68.5	Conventional activated sludge	Continuous	Co-thickening/anaerobic digestion	Incineration or Agricultural land
Mississauga (Lakeview)	284.13	256.9	90.4	Conventional activated sludge	Continuous	Centrifuge thickening/ theraml conditioning/ vacuum filtration/ anaerobic digestion	Incineration and ash lagoon
Moore (Corunna)	4.46	2.18	47.9	Extended aeration	Continuous	Holding tank, decanted	
Niagara Falls (Stamford)	58.20	ı	1	Rotating biological contactors Continuous	s Continuous	Anaerobic digestion	Lagoon

Table 4-2 Continued

Sludge Disposal	Agricultural land	Agricultural land	Agricultural land	Incineration ng	Landfill	Hauled	Incineration	Landfill	Incineration al	Landfill	Agricultural land		Hauled to Whitby (Corbett Ck.) WPCP	Landfill
Sludge Treatment	Co-thickening/anaerobic digestion	Aerobic digestion/ thickening/storage	Co-thickening anaerobic digestion	Co-thickening anaerobic digestion/filter dewatering	Co-thickening/filter dewatering	Anaerobic digestion	Dissolved air flotation/ anaerobic digestion/ grinding/heat treatment/ centrifuge dewatering	Dissolved air flotation/ anaerobic digestion/ elutriation/vacuum filtration	Dissolved air flotation/ anaerobic digestion/thermal oxidation/filter dewatering	Anaerobic digestion/ centrifuge dewatering	Co-thickening/anaerobic digestion	Anaerobic digestion/filter dewatering	Co-thickening/anaerobic digestion	Co-thickening/centrifuge dewatering
Phosphorus Removal	Continuous	Continuous	Continuous	Continuous	Continuous	No removal	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Process	Conventional activated sludge	Extended aeration	Conventional activated sludge	Conventional activated sludgde Continuous	Conventional activated sludge	High rate	Conventional activated sludge	Conventional activated sludge	Conventional activated sludge	Conventional activated sludge	Conventional activated sludge	Conventional activated sludge	Conventional activated sludge	Conventional activated sludge
1987 Flow as & of Design	59.5	35.7	74.5	93.0	36.6	71.8	9.77	98.4	93.8	80.6	102.0	99.1	63.6	90.2
1987 Average Flow (10 ³ m ³ /day)	13.52	2.52	50.79	176.0	6.65	48.97	170.0	402.7	767.2	36.65	46.38	92.9	3.61	32.76
Design Flow Capacity (10 ³ m ³ /day)	22.73	7.05	68.19	189.25	18.18	68.19	218.21	409.19	818.3	45.46	45.46	6.82	5.68	36,32
Plant	Oakville (S.E.)	Paris	Peterborough	Pickering (Duffin Creek)	Sault Ste. Marie (West)	Sudbury	Toronto (Highland Creek)	Toronto (Humber)	Toronto (Main)	Toronto (North)	Waterloo	Wallaceburg	Whitby (Pringle Cr. #1)	Windsor (Little River)

	Sludge Disposal		Landfill	Agricultural land	Lagoon	Lagoon		Landfill	Agricultural land		•	1			
	Sludge Treatment S		Anaerobic digestion/ La centrifuge dewatering	Anaerobic digestion Ag (centrifuge dewatering)/ storage	Anaerobic digestion La	Anaerobic digestion La	Vacuum filtration	Anaerobic digestion La	Centrifuge dewatering/ Ag composting		No sludge production	No sludge production			
	Phosphorus Removal		Continuous	Continuous	Continuous	Continuous	No removal	Continuous	Continuous		No removal	No removal			
Table 4-2 Continued	Process		Primary	Primary	Primary	Primary	Primary	Primary	Primary with polymer addition		Aerated cells plus lagoon	Conventional lagoon			
	1987 Flow as & of Design		116.5	103.4	73.4	9.9/	58.7	74.3	75.6		82.5	168.4			
	1987 Average Flow (10 ³ m³/day)		43.68	63.48	400,25	54.00	32.02	81.11	123.64		14.18	6.40			
	Design Flow Capacity (103m3/day)		37.50	61.37	545.0	70.47	54.55	109.11	163.65		17.18	3.80			
	Plant	Primary Plants	Cornwall	Kingston (City)	Ottawa (Green Creek)	Sarnia	Sault Ste. Marie (East)	Thunder Bay	Windsor (Westerly)	Lagoons	Lindsay	Niagara-on-the-Lake			

A wide range of sludge treatment methods were used at the 37 WPCPs to reduce the sludge volume before ultimate disposal. Processes for pre-thickening (not including co-thickening in the primary clarifiers) are used at 5 facilities. Anaerobic digestion of sludges is used at the majority (26) of the facilities. Two of the plants (Belle River, Clarkson) use aerobic digestion and 7 plants do not have sludge digestion processes before disposal, but do utilize dewatering processes. Additional treatment of digested sludges included dewatering (13 plants), elutriation (Humber WPCP) and heat treatment (Highland Creek WPCP, Main WPCP and Lakeview WPCP).

Three main methods of sludge disposal are utilized, including incineration application to agricultural land and landfilling. In some cases, sludge is transferred to another WPCP for treatment and/or disposal.

4.2.3 Historical WPCP Performance Summary

Table 4-3 presents the annual average effluent concentrations of BOD, suspended solids (TSS) and phosphorus for the 37 plants of this study, for 1986 and 1987. Also indicated is whether the plant complied with the MOE minimum effluent requirements for municipal treatment facilities presented in Table 4-4. It should be noted that plant specific effluent requirements, as required by some WPCPs, were not considered in the evaluation of compliance.

Table 4-3 shows that the secondary plants selected have generally complied in the past with the BOD₅ and TSS requirements. Out of the 7 primary plants, Cornwall WPCP did not comply with TSS requirements in both years, and Ottawa (Green Ck) WPCP did not comply with BOD₅ removal requirements in both years. Both Lindsay and Niagara-on-the-Lake lagoons were in compliance with respect to BOD₅ in both years. However, Lindsay did not comply with TSS limits in 1987.

In 1986 and 1987, only 24 of the study plants were in compliance with the phosphorus requirement of ≤1.0 mg/L, assessed on a monthly average basis. Seven plants were out of compliance in one year, and 3 plants (Peterborough, Cornwall and Green Creek) did not comply in either year. Three plants (Sudbury, Sault Ste. Marie East, and Niagara-on-the-Lake) did not have phosphorus removal in 1986 and 1987 and therefore were not subjected to a phosphorus requirement.

Table 4-3 SUMMARY OF HISTORICAL PERFORMANCE OF 37 WPCPB (1981-1986)

	Comments								Phosphorus removal without chemicals								Primary plant before 1987						No phosphorus removal at present.	1988 installation.			
	ance*					z			z											z			XX.				
Average at TP /L)	Compliance*		z							z										z	z	z	NR			z	
Annual Average Effluent TP (mq/L)	1987		9.0		0.7	1.0	0.7	0.5	1.0	0.8	0.8	0.7	9.0	6.0	0.7	0.4	0.7	0.5	0.5	1.0	9.0	6.0	2.3	d	8.0	6.0	
α,	1986		1.0		0.8	8.0	0.7	0.5	0.7	1.0	0.7	0.7	9.0	0.8	9.0	9.0	9.0	9.0	9.0	3.6	1.0	1.0	2.2	0	0.8	1.0	
erage TSS	Compliance 1986 1987																										
Annual Average Effluent TSS (mq/L)	1987		12.8		11.1	11.2	7.3	11.0	12.3	8.1	5.2	12.3	5.3	10.0	14.3	7.5	15.8	6.5	5.4	6.2	13.4	8.6	8.3	9	19.0	20.1	
An E	1986		8.9		14.8	10.4	9.5	9.4	19.1	9.5	5.2	10.1	4.3	9.2	14.0	8.6	16.5	8.4	9*9	5.5	20.6	6.6	12.6	0	73.8	21.1	
	ance 1987																										
rerage BOD ₅	Compliance 1986 1987								z																		
Annual Average Effluent BOD ₅ (mq/L)	1987		14.1		4.9	13.4	9.3	20.6	27.5	7.5	15.5	4.8	3,3	14.2	17.8	7.0	11.9	2.9	5.0	6.6	19.8	11.5	12.2	ď	9.0	0.6	
	1986		10.7		16.7	12.2	10.8	13.8	15.7	8,3	12.1	4.0	7.6	12.7	16.4	7.0	20.9	5.0	8.7	14.3	22.3	12.2	12.9	18 7	1.01	11.3	
	Plant	Tertiary	Gue1ph	Secondary	Belle River (Maidstone)	Brantford	Burlington (Skyway)	Grimsby (Baker Road)	Hamilton	Kingston TWP	Kitchener	London (Greenway)	London (Pottersburg)	Mississauga (Clarkson)	Mississauga (Lakeview)	Moore (Corunna)	Niagara Falls (Stamford)	Oakville (S.E.)	Paris	Peterborough	Pickering (Duffin Creek)	Sault Ste. Marie (West)	Sudbury	Toronto (Highland Creek)	יייייייייייייייייייייייייייייייייייייי	Toronto (Humber)	

Compliance is assessed on a monthly average. For compliance, all months TP average <1.0 mg/L. NR = No effluent requirements for plants without phosphorus removal. Notes:

		Comments												No phosphorous removal					No phosphorous removal
	ince*	1987								z		z		NR					NR
verage t TP L)	Compliance*	1986								z		z		NR					NR
Annual Average Effluent TP (mg/L)	-1	1987	9	0.8	8.0	0.7	9.0	0.5		1.0	9.0	2.2	6.0	2.4	1.0	0.7		0.7	3,3
An		1986	6	0.7	6.0	0.5	9.0	0.7		2.5	9.0	1.9	0.7	3.4	6.0	0.7		2.6	3.1
	nce	1987										z							
rage TSS	Compliance	1986	2	:								z						z	
Annual Average Effluent TSS (mg/L)	'	1987	23.0	6.9	14.3	9.6	12.3	8.8		28.6	16.5	32.5	24.1	38.8	70.7	23.3		11.0	28.0
Anr		1986	29.6	9-9	9.3	14.2	10.4	9.1		25.5	16.5	72.9	20.2	41.5	51.4	20.6		81.1	26.9
	ance	1987								z									
erage BOD ₅	Compliance	1986								z									
Annual Average Effluent BOD ₅ (mq/L)		1987		18.1	7.5	11.1	6.3	5.1		38.6	18.1	38.6	39.1	66.1	57.7	24.2		10.5	23.5
7, 11		1986	17.1	17.9	6.8	16.9	10.2	5.4		41.1	23.7	34.5	33.1	6.69	53.2	25.9		10.5	27.7
		Plant		Toronto (North)	Waterloo	Wallaceburg	Whitby (Pringle Cr. #1)	Windsor (Little River)	Primary	Cornwall	Kingston (City)	Ottawa (Green Cr.)	Sarnia	Sault Ste. Marie (East)	Thunder Bay	Windsor (Westerly)	Lagoons	Lindsay	Niagara-on-the-Lake

Compliance is assessed on a monthly average. For compliance, all months TP average <1.0 mg/L. NR = No effluent requirements for plants without phosphorus removal. * Notes:

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Table 4-4
MOE 1987 Effluent Discharge Requirements for Ontario Wastewater Treatment Facilities

Treatment Type	Requirements	Basis
Secondary with phosphorus removal	BOD ₅ ≤25 mg/L TSS ≤25 mg/L TP ≤1.0 mg/L	Annual Average Annual Average Monthly Average
Secondary without phosphorus removal	BOD ₅ ≤25 mg/L TSS ⁵ ≤25 mg/L	Annual Average Annual Average
Primary with phosphorus removal	BOD ₅ Removal ≥50% TSS Removal ≥70% TP ≤1.0 mg/L	Annual Average Annual Average Monthly Average
Primary without phosphorus removal	BOD ₅ Removal >30% TSS Removal >50%	Annual Average Annual Average
Lagoon with phosphorus removal	BOD ₅ ≤30 mg/L TSS ≤40 mg/L TP ≤1.0 mg/L	Annual Average Annual Average Monthly Average
Lagoon without phosphorus removal	BOD ₅ ≤30 mg/L TSS ≤40 mg/L	Annual Average Annual Average Monthly Average

5.1 QA/QC Analytical Results

Detailed descriptions of the QA/QC program results from each contract laboratory are presented in individual laboratory reports, which in turn have been summarized in a report by Zenon Environmental Inc. (Ref. 4).

5.1.1 Detection Limits (DLs)

For the purposes of the present study, each target pollutant in each sample type was assigned a detection limit (DL). It was not intended that the DLs represent the lowest detection capability achievable, but rather, that they reflect a routinely available capability that would serve the needs of the study. In this regard, the statistical significance of a true method detection limit (MDL) (Ref. 5) cannot be used for the DLs. The resulting DLs for the present study for samples of raw wastewater, effluent water and sludges are presented in Tables 5-1(a) to 5-1(c).

For base neutral and acid extractable compounds (Table 5-1(a)) compound DLs were in the range of 10 to 75 $\mu g/L$ for raw sewage, 2 to 15 $\mu g/L$ for final effluents and 0.2 to 2 mg/L for sludges.

For volatile organic compounds, (Table 5-1(b)), compound DLs were in the range of 40 - 400 $\mu g/L$ (with one exception of 5 mg/L for hexanol) for raw sewage, 2 to 100 $\mu g/L$ (with the exception of 400 $\mu g/L$ for hexanol) for final effluents, and from 40 to 400 $\mu g/L$ (5 mg/L for hexanol) for sludges.

For pesticides and herbicides, compound DLs were in the range of 0.02 to 10 $\mu g/L$ for raw sewage, 0.01 to 2 $\mu g/L$ for final effluents and 0.2 to 100 $\mu g/L$ for sludges.

For dioxin/furan analyses, due to the complexity of the samples, the DLs were highly variable depending on the cleanliness, homogeneity and interference associated with an individual sample. Therefore, a DL was established for each individual sample. The DLs for more than 95 percent of the samples ranged from 0.1 to 5 ng/L for raw sewage and final effluents, and from 0.05 to 4 $\mu g/L$ for sludges. Table 5-1(d) presents the minimum DLs found for each of the compounds.

For metals analyses (Table 5-1(e)) DLs ranged from 0.01 to 0.05 mg/L for raw sewages and final effluents. The DL for mercury was the exception with a value of 0.01 μ g/L. The range of metals DLs for sludges was 0.01 to 3 mg/L, with a DL for mercury of 0.01 μ g/L. The method detection limit for cyanide was 1 μ g/L for all three sample types.

Table 5-1(a)
DETECTION LIMITS BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS

Compound Name	Compound Code	DL Raw Sewage (µg/L)	DL Effluents (µg/L)	DL Sludges (liquid) (µg/L)
2,4,5-Trichlorophenol 2,4-Dichlorophenol 2,4-Dinitrotoluene 2,6-Dinitrotoluene 2,6-Dinitrotoluene 2,6-Dinitrotoluene 2,6-Dinitrotoluene 2 Hydroxy-toluene (O-Cresol) 2-Chlorophenol 3 Hydroxy-toluene (M-Cresol) 4 Hydroxy-toluene (M-Cresol) 4 Hydroxy-toluene (P-Cresol) 6 Hydroxy-toluene (P-Cresol) 6 Hydroxy-toluene 6 Henzo (a) anthracene 6 Benzo (a) anthracene 6 Henzo (a) Hothalate 6 Hothysene 6 Diazinon 7 Dibenzo (ah) anthracene 7 Di-n-butyl phthalate 8 Diphenyl ether 8 Diphenyl ether 8 Di-n-butyl phthalate 8 Diphenyl ether 9 Di-n-butyl phthalate 9 Di-n-butyl phthalate 8 Di-n-octyl phthalate 8 Di-n-octyl phthalate 9 Di-n-octyl phthalate 9 Di-n-octyl phthalate 9 Horoxy-toluene 9 N-Nitroso diphenylamine 9 N-Nitroso-di-n-propyl-amine 9 Parathion methyl 9 Porton-M-cresol 7 Tri-n-tolyl phosphate	X3245 X3246 PM24DP PM24DP PM24DT PM26DT PM26DT PM2CRE PM24DT PM2CRE PM24DT PM2CRE PM4BPE PM4CRE PM4BPE PM5CRE PM4BPE PM5CRE PM4BPE PM6CRE PM4BPE PM6CRE PM4BPE PM6CRE PM6C	225555555555005505000055050000055050505050	5555333255333223330522222222222332222225505523232552222055522335	500 500 500 500 300 300 300 300

Table 5-1(b)
DETECTION LIMITS FOR VOLATILE ORGANIC COMPOUNDS

Compound Name	Compound Code	DL Raw Sewage (µg/L)	DL Effluents (µg/L)	DL Sludges (liquid) (µg/L)
1,1,1-Trichloroethane	х1111т	40	2	40
1,1,2,2-Tetrachloroethane	X11122	40	2	40
1,1,2-Trichloroethane	х1112т	40	5	40
1,1-Dichloroethene	X111CE	40	2	40
1,1-Dichloroethene	XlDCLE	40	2	40
1,2-Dichlorobenzene	X212CB	40	2	40
1,2-Dichloroethane	X112CE	40	2	40
1,2-Dichloropropane	X112CP	40	2	40
1,3-Dichlorobenzene	X213CB	40	2	40
1,4-Dichlorobenzene	X214CB	40	2	40
1-Octene	Blocte	60	3	60
2-Chloroethylvinyl ether	PM2CEE	40	10	40
3-Chloro-1-propene	X2CPPE	40	2	40
3-Chloro-toluene	X23CTD	40	2	40
Acrolein	X2ACRO	400	100	400
Acrylonitrile	Xlacry	400	100	400
Benzene	B2BENZ	40	2	40
Bromodichlorobenzene	B2BDCL	40	10	40
Bromodichloromethane	X1BDCM	60	3	60
Bromoethane	XlBETH	40	2	40
Bromoform	XIBROM	60	10	60
Carbon tetrachloride	XICTET	40	2	40
Chlorobenzene	X2CBEN	40	2	
Chloroethane	XICHLE	40	2	40
Chloroform	XICHLO	40	2	40
Chloromethane	XlCHLM	40	20	40
cis-1,3-Dichloropropene	X113DP	60	3	60
cis-1,2-Dichloroethylene	X1CDCE	40	2	
Dibromochloromethane	X1CDBM	40	2	
Dichlorodifluoromethane	XIDCFM	40	20	40
Diethyl ether	ElDIEE	40	2	40
Ethylbenzene	B2BENZ	40	2	40
Hexane	BlHEXA	60	3	60
Hexanol	LlHEX	5000	400	5000
Methylene chloride	XlDCLM	60	3	60
Styrene	B2STYR	40	3	40
Tetrachloroethylene	XITETR	40	2	
Toluene	B2TOLU	40	2	40
trans-1,3-dichloropropene	X113DR	40	2	40
Trichloroethylene	XlTRIC	40	2	
Trichlorofluoromethane	XlTCFM	40	2	40
Vinyl bromide	BlVBR	60	3	60
Vinyl chloride	XlVCL	100	50	100

Table 5-1(c)
DETECTION LIMITS FOR PESTICIDES AND HERBICIDES

Compound Name	Compound Code	DL Raw Sewage (µg/L)	DL Effluents (µg/L)	DL Sludges (liquid) (µg/L)
1,2,4-Trichlorobenzene	X2124	0.02	0.01	0.2
2,4,5-T	P3245T	0.1	0.05	1
2,4-D	P324D	0.04	0.02	0.4
Aldrin	Plaldr	0.04	0.02	0.2
Alpha-BHC	PlBHCA	0.02	0.01	0.2
Alpha-chlordane	PlCHLA	0.02	0.01	0.2
Alpha-endosulphan	PIENDl	0.02	0.01	0.2
Beta-BHC	PlbHCB	0.02	0.01	0.2
Beta-endosulphan	PlEND2	0.02	0.01	0.2
Captan	POCAPN	0.4	0.2	4
Delta-BHC	PlBCHD	0.02	0.01	0.2
Dieldrin	PlDIEL	0.02	0.01	0.2
Endosulphan sulphate	Plends	0.08	0.04	0.8
Eldrin	PlENDR	0.02	0.01	0.2
Eldrin aldehyde	PlENDA	0.4	0.2	4.0
Gamma-BHC	PlBHCG	0.02	0.01	0.2
Gamma-chlordane	PlCHLG	0.02	0.01	0.2
Heptachlor	PlhepT	0.02	0.01	0.2
Heptachlor epoxide	Plhepe	0.02	0.01	0.2
Hexachlorobenzene	X2HCB	0.02	0.01	0.2
Hexachlorobutadiene	X1HCB	0.2	0.1	2
Hexachlorocyclopentadiene	X1HCCP	0.2	0.1	2
Hexachloroethane	X1DCLE	10	2	40
Methoxychlor	PIDMDT	0.01	0.05	1.1
Mirex	PlMIRX	0.02	0.01	0.2
Oxychlordane	PlDCHL	0.02	0.01	0.2
PCNB	POPCNB	0.1	0.05	1
Photomirex	PlPMIR	0.02	0.01	0.2
PP-DDD	PlppDD	0.02	0.01	0.2
PP-DDE	Plppde	0.02	0.01	0.2
PP-DDT	PlppDT	0.02	0.04	0.8
Silvex	P3SILV	0.1	0.05	1
Strobane	PlsTRO	10	5	100
Total PCB	PlPCPT	0.08	0.04	0.8
Toxaphene	PlTOX	0.08	0.04	0.8

Table 5-1(d)
DETECTION LIMITS FOR DIOXIN/FURAN COMPOUNDS

Compound Name	Compound Code	DL Raw Sewage (ng/L)	DL Effluents (ng/L)	DL Sludges (liquid) (µg/L)
Tetrachlorodibenzodioxins	P94CDD	0.5	0.1	0.15
Tetrachlorodibenzofurans	P94CDF	0.2	0.1	1.50
Pentachlorodibenzodioxins	P95CDD	1.0	0.5	0.6
Pentachlorodibenzofurans	P95CDF	0.4	0.1	0.5
Hexachlorodibenzodioxins	P96CDD	1.0	0.3	0.4
Hexachlorodibenzofurans	P96CDF	0.7	0.1	1.0
Heptachlorodibenzodioxins	P97CDD	1.0	0.1	2.0
Heptachlorodibenzofurans	P97CDF	1.0	0.1	1.0
Octachlorodibenzodioxin	P98CDD	1.0	0.3	0.2
Octachlorodibenzofuran	P98CDF	1.0	0.2	0.5

Table 5-1(e)
DETECTION LIMITS FOR METALS AND CYANIDE

Compound Name	Compound Code	DL Raw Sewage (mg/L)	DL Effluents (mg/L)	DL Sludges (liquid) (mg/L)
Aluminum	ALUT	0.02	0.02	0.5
Beryllium	BEUT	0.01	0.01	0.5
Cadmium	CDUT	0.003	0.003	0.5
Calcium	CAUT	0.002	0.002	0.5
Chromium	CRUT	0.01	0.01	0.5
Cobalt	COUT	0.01	0.01	1
Copper	CUUT	0.01	0.01	0.5
Cyanide	CCNFUR	0.001	0.001	0.001
Lead	PBUT	0.03	0.03	0.5
Magnesium	MGUT	0.01	0.01	0.5
Mercury (µg/L)	HGUT	0.01	0.01	0.01
Molybdenum	MOUT	0.01	0.01	0.25
Nickel	NIUT	0.01	0.01	3
Selenium	SEUT	0.03	0.03	1
Silver	AGUT	0.01	0.01	0.5
Strontium	SRUT	0.01	0.01	0.5
Zinc	ZNUT	0.02	0.02	0.5

5.1.2 Method Blank Results

As previously noted in Section 3, one method blank with each batch of samples was routinely analyzed at each contract laboratory performing organics analyses. The results were used to establish the background contamination or "noise level" of each contaminant.

At the end of each day, the arithmetic mean of the compound concentration for each compound was calculated, and subtracted for the compound concentration measured in each sample for that day. This calculation was made to correct samples for the background "noise level".

When the analyses had been completed for all samples for a specific stream type, the arithmetic mean and standard deviation for the concentrations of each contaminant in the method blanks were calculated.

Since the "noise level" varied from day to day, MOE LSB staff felt that the "noise level" averaged over the duration of the study would be representative of the contamination problem with the compound in question, while the "noise level" established for each analytical run may not have been representative of that particular run. For this purpose, MOE established a criterion to determine if the "noise" level was too high to use the sample analytical data with confidence. If twice the standard deviation of the method blank results was greater than the analytical result for a compound averaged for a particular stream type, then the background concentration was considered too high, the entire analytical results for that compound were not considered valid and the compound was excluded from the data presentation for that stream types. Table 5-2(a) presents the compounds detected in 5 percent or more of the laboratory blank samples analyzed. Table 5-2(b) presents a list of the contaminants that did not meet the blank criterion, and are subsequently excluded from further result presentation.

5.1.3 Field Blank Results

There were a total of 19 field blank samples analyzed, including 8 for volatile organic compounds, 9 for base-neutral and acid extractable compounds and pesticide/herbicide compounds and 2 for dioxin/furan compounds. The field blanks were analyzed for all of the target compounds in each group.

Table 5-3 presents the contaminants identified in field blanks.

Table 5-2(a)
CONTAMINANTS DETECTED IN METHOD BLANK SAMPLES

Compound	Average Concentration (µg/L)	Standard Deviation (µg/L)	No. of Samples Analyzed	No of Times Times Compound was Detected
Di-n-butyl phthalate	1.5	2.8	75	49
Bis-2-Ethylhexyl phthalate	47.7	84.8	75	70
Di-n-octyl phthalate	0.2	0.9	75	6
Di-ethyl phthalate	0.3	1.7	75	7
Methylene chloride	9	6	73	66
Chloroform	3	3	73	29
Toluene	3	5	73	43
Benzene	4	3	73	42
Hexane	7	11	73	40
Bromodichloromethane	3	1	73	9
Methoxychlor	0.08	0.03	34	3

Table 5-2(b)
CONTAMINANTS WITH INVALID ANALYTICAL RESULTS DUE TO METHOD BLANK RESULTS

	Contaminant			Sam	ple Types			
Code	Name	Raw Sewage	Primary Effluent	Lagoon Effluent	Secondary Effluent			Treated Sludge
X1CHLO	Chloroform		Х		х	х		
B1HEXA	Hexane		X	X	X		X	X
B2BENZ	Benzene		Х	X	X		X	X
X1BDCM	Bromodichloromethane		Х		X			
B2TOLU	Toluene		X	X	X		X	Х
РМРЕНР	Bis-2-Ethylhexyl phthalate	X	X	Х	Х		Х	X
PMDNBP	Di-n-butyl phthalate		X	X	X		X	X
PMDNOP	Di-m-octyl phthalate		Х	Х			X	
PMDEP	Diethyl phthalate			X	Х		X	
X1DCLM	Dichloromethane		Х	X	X		X	X
PlPMDT	Methoxychlor		X		X			

Notes: X - indicates that the data for the contaminant in the indicated sample type did not meet study QA/OC criteria and was therefore deleted from subsequent evaluation.

Table 5-3
CONTAMINANTS DETECTED IN FIELD BLANKS

Compound Group	Parameter	Concentrations	Frequency
Base-neutral and acid extractables	Di-n-butyl phthalate	3.2 µg/L	1/9 samples
Pesticides/ Herbicides	Methoxychlor	0.1 µg/L, 0.1 µg/L	2/9 samples
neibicides	Endosulphan Sulphate	0.09 μg/L	1/9 samples
	2,4-Dichlorophenoxy- acetic acid	0.04 µg/L	1/9 samples
Volatiles	Hexane	13.0 µg/L	1/8 samples

Only 5 organic compounds were detected in the field blanks at concentrations greater than the DLs and in a maximum of 22 percent of tested samples. No dioxin compounds were detected in field blanks.

It was concluded from the field blank results that the level of contamination introduced from the field equipment field sample handling methods and sample transport was not significant.

5.1.4 Results of Duplicate Analyses

Duplicate analyses were carried out in each analytical laboratories in order to determine the variability of the sample results. These results are presented in detail in the individual laboratory reports (Ref. 4).

In a large percentage of the duplicate analyses carried out, one or both of the aliquots results were below the DL and comparisons could not be made. Since there were so few usable duplicate results, the analytical variability as evaluated using these results was inconclusive.

5.1.5 Surrogate Spike Recoveries

Deuterated compounds were added as surrogate spikes to each sample analyzed for volatile and base/neutral acid extractable compounds. Bromofluorobenzene was also added in the spike mixture for volatiles analysis. For dioxin and furan analyses C² labelled tetra and octa dioxin congenors were spiked into the samples. No surrogate spikes were added to samples for pesticide/herbicide analysis since mass spectrometry was not employed for the analysis of these compounds.

Table 5-4(a) - Table 5-4(c) summarize the recoveries of the surrogates by sample type. The summary results show that recoveries of the same surrogate compound in each sample type are very similar (no statistically significant difference at 95% confidence level). Consequently, it was concluded that there was no significant effects of the stream type during this study and the compound recoveries obtained in the blank water spike samples could be used as an indication of average recoveries for all sample types.

Table 5-4(a)
BASE/NEUTRAL COMPOUND SURROGATE RECOVERY SUMMARY BY STREAM TYPE

			Surrogate Co	mpound	
	d ₅ - phenol	d ₄ - nitrophenol	d ₈ - naphthalene	d ₁₀ - anthracene	d ₁₂ - benzo-a-pyrene
Raw Sewage					
Average Std. dev. No. of data averaged*	38% 5.4% 280	71% 15.6% 280	72.7% 14.8% 280	110.3 19.7% 280	89.2 14.3% 280
Primary Effl	uent				
Average Std. dev. No. of data averaged*	38.6% 6.3 37	71.0% 13.5% 37	70% 16.8% 37	107% 15.5% 37	90.5% 16.7% 37
Secondary Ef	fluent				
Average Std. dev. No. of data averaged*	37% 5.2% 280	71% 15.6% 280	67.9% 12.4% 280	102.5% 19.2% 280	90.5% 15.9% 280
Sludges					
Average Std. dev. No. of data averaged*	52% 10.9% 117	70% 18.2% 117	72.6% 17.8% 117	112.7% 29.2% 117	80.5% 17.8% 117
Method Blank	<u>.</u>				
Average Std. dev. No. of data averaged*	36% 22% 72	68% 29% 72	73% 30% 72	89% 30% 72	89% 30% 72

Notes: * - No surrogate data were rejected in any case

Table 5-4(b)
DIOXIN/FURAN COMPOUND SURROGATE RECOVERY BY SAMPLE TYPE

		ä	3C12-T4CDD			1	13C12-08CDD	
Sample Type	Average % Rec.	Std. Dev. %	No. of data No. of Data averaged rejected	No. of Data rejected	Average % Rec.	Std. Dev. %	No. of data No. of dat averaged rejected	No. of data rejected
Primary Effluent	8.09	18.9	8	0	64.3	14.7	7	1
Secondary Effluent	51.8	22.4	49	3	6.99	28.3	52	0
Recycle	59.1	14.4	8	2	64.7	20.5	6	1
Raw Sewage	58.4	27.3	54	٣	63.6	24.8	57	0
Sludge	78.3	36.8	74	12	72.3	27.9	85	1
Method Blank	56.4	28.4	24	0	9.59	24.3	23	1
Native Spike	36.7	18.5	12	0	48.6	22.2	12	0

Table 5-4(c) VOLATILE ORGANIC COMPOUND SURROGATE RECOVERY BY SAMPLE TYPE

		d4-Dic	d4-Dichloroethane	ø.		Bromofl	Bromofluorobenzene	ne		-8p	d8-Toluene			d2-Ch	d5-Chlorobenzene	je.
	Avg. & Std.	Std.	No.	No.	Avg. 8 Std.	Std.	No.	No.	Avg. & Std.	Std.	No.	No.	Avg. % Std.	Std.	No.	No.
Sample Type	Rec.	Dev.8	Averaged	Rejected	Rec.	Dev. &	Dev.% Averaged Rejected	Rejected	Rec.	Dev. &	Dev. & Averaged Rejected	Rejected	Rec.	Dev.	Dev.& Averaged Rejected	Rejected
rimary Effluent	97	12	35	1	92	15	33	٣	95	13	36	0	93	16	36	0
Secondary Effluent	96	16	225	80	97	16	205	28	94	12	222	11	96	16	225	8
Recycle 103	18	43	1	66	17	37	7	100	11	42	2	102	11	41	33	
Raw Sewage	100	14	212	2	66	16	194	23	100	10	213	4	66	14	208	6
	104	12	87	7	100	18	83	11	103	11	93	-	103	13	88	9
Native Spike	66	10	26	2	101	13	25	3	86	11	24	4	100	13	28	0
Method Blank	102	14	65	80	96	31	64	6	86	16	99	7	95	20	69	4

(KIR18/285W)

5.1.6 Recovery of Native Spikes from Distilled Water

Tables 5-5(a) to 5-5(d) present summaries of the native spike recoveries from distilled water samples for each compound group. Where no data is presented, spiking of the compound in question was not done.

A system was established by the MOE to use the analytical QA/QC results to identify the qualitative and quantitative applicability of the analytical results. Each contaminant was given a code, which was used to label the value of the result in qualitative and quantitative terms. The codes describe recovery criteria, based on spiking of a native compound into a distilled water sample. If spiking of this native compound was not done, the code used was based on historical recovery data from MOE LSB.

The QA/QC codes and associated recovery criteria, as established by the MOE, are:

QA/QC Code	Recovery Criteria
1	The average recovery of the native compound in distilled water samples was within 50 and 150 percent inclusive, and 70 percent or more of individual recovery data were within 50 and 150 percent.
2	The average recovery of the native compound in distilled water samples and individual percent recovery data do not fit the criteria for 1, 3, 4 and 5 .
3	The average recovery of the native compound in distilled water samples is either less than 30 percent, or, more than 30 percent of individual recovery data are less than 30 percent.
4	The average recovery in distilled water samples is greater than 150 percent, or, more than 30 percent of individual percent recovery data are greater than 150 percent.
5	More than 30 percent of individual recovery data are less than 30 percent, and, more than 30 percent of individual recovery data are greater than 150 percent.
0	Analyzed by MOE LSD using internal QA/QC procedures

TABLE 5-54)
SUMMARY OF RECOVERY OF MATIVE BASE/NEUTRAL AND ACID EXTRACTABLE COMPOUND SPIKES FROM FROM DISTILLED WATER SAMPLES

		Water	Sample	es Sp	iked	With M	lativ	Comp	ounds		
Compound Code	Compound Name	AVG.	STD. DEV OF	DATA	USED DATA	USED DATA	DATA <301 REC	DATA <301 REC	DATA >1501 REC	DATA >150% REC	Q Co 1
X3245	2.4.5-TRICHLOROPHENOL	68.7	22.5	71	52	73.2	1	1.4	0		-
X3246	2, 4, 6-TRICHLOROPHENOL	83.0		68	66	97.1	0	0.0	0	0.0	11
PM24DP	2.4-DICHLOROPHENOL	75.6	21.6	68	64	94.1	2	2.9	0	0.0	
PM24MP	2, 4-DIMETHYLPHENOL	57.0	25.0	68	43	63.2	10	14.7	0	0.0	
PM24NP	2,4-DINITROPHENOL			0							11
PH24DT	2,4-DINITROTOLUENE	96.0		68		100.0	0	0.0	0		11
PM26DT	2, 6-DINITROTOLUENE	89.0		68	67	98.5	0	0.0	0		11
x30010	2-CHLOROPHENOL	67.0			50	73.5	3	4.4	0		!!
PM46DP	2-METHYL4, 6-DINITROPHENOL	98.0			33	48.5	15	22.1	16	23.5	
PM2NP	2-NITROPHENOL	76.0			61	89.7	0	0.0	0	0.0	
PMABPE	4-BROMOPHENY LPHENY LETHER	86.0			66 64	97.1 94.1	0	0.0	0		П
PM4CPE	4-CHLOROPHENYLPHENYLETHER	83.0				47.1	11	16.2	0		
PMANP	4-HITROPHENOL	47.0 81.0				97.1	0	0.0	ū		11
PNACNE	ACENAPHTHENE	84.0				95.6	0	0.0	Ö		ii.
PHACNY PMANAA	ACEMAPHTHYLENE ALPHA-NAPHTHYLAMINE	74.0				69.1	7	10.3	3		ii.
	ALPHA-NAPHIHILAMING AMETRYNE	89.0				97.1	ó	0.0	ō		ii
P2AMET PHANTH	ANTHRACENE	89.0				98.5	ō	0.0	ō		ii
PZATRA	ATRAZINE	104.0				80.9	3	4.4	9		ii.
PNBAA	BENZO (a) ANTHRACENE	86.0				95.6	ō	0.0	0	0.0	ii
PNBAP	BENZO (a) PYRENE	83.5				95.8	1	1.4	1	1.4	11
PNBBFA	BENZO (b) FLUORANTHENE	86.0		68	65	95.6	0	0.0	1	1.5	11
PNGHIP	BENZO (g, h, i) PERYLENE	81.0		68	60	88.2	0	0.0	1	1.5	11
PNBKE	BENZO (k) FLUORANTHENE	84.0	19.0	68	64	94.1	0	0.0	1		П
PHBNAA	Beta-MAPHTHYLAMINE	72.0	29.0	68	49	72.1	3	4.4	0		П
PNBIPH	BIPHENYL	79.0	17.0	68	66	97.1	0	0.0	0		11
PHB2EH	Bis (2-CHLOROETHOXY) METHANE	73.0				91.2	0	0.0	0		11
PMB2IE	Bis (2-CHLOROIPROPYL) ETHER	71.0	24.0			17.9	1	1.5	0		11
PHBEHP	Bis-2-ethylhexylphthalate	192.0	133.0			52.9	0	0.0	31	45.6	
PMB2NE	Bis-(2-CHLOROMETHYL) ETHER										Н
PMBBP	BUTYLBENZYLPHTHALATE	91.0				97.1	0	0.0			11
PH2CNA	CHLORONAPHTHALENE	76.0				92.6	3	4.4	0	0.0	
PNCHRY	CHRYSENE	87.0				94.1		0.0		0.0	
PADIAZ	DIAZINON	90.0				92.6	-	0.0		0.0	
PNOAHA	DIBENZO (a, h) ANTHRACENE	81.0 91.0				98.5		0.0			ii
PODICH	DICHLORAN	96.0				95.6		0.0			ii
PMDEP	DIETHYL PHTHALATE DIMETHYL PHTHALATE	90.0				97.1		0.0	_		ii
PMDPE	DIPHENYL ETHER	79.0				95.6		0.0			ii.
PMDNBP	DI-N-BUTYLPHTHALATE	91.0				97.1		0.0	0	0.0	11
PMDNOP	DI-N-OCTYLPHTHALATE	93.0) 68	66	97.1	0	0.0		1.5	
PHFLAN	FLUORANTHENE	87.0	16.0	3 68	67	98.5	0	0.0		0.0	
PHELUO	FLUORENE	85.1	15.0	0 61	67	98.5		0.0		0.0	
PHINP	IDENO(1,2,3-cd)PYRENE	81.	0 20.1			92.6		0.0			11
PAHALA	MALATHION	92.				100.0		0.0			11
PAMPAR	METHYLPARATHION	91.				98.5		0.0		0.0	
PHINCRE	M-CRESOL	17.			-	80.3		4.2		4.2	
PNNAPH	NAPHTHALENE	76.				95.8		2.5		0.0	
PMNITB	NITROBENZENE	74.				83.1		0.0		0.0	
PMNND	H-HITROSODIPHENYLAMINE	90.						8.5			11
PMNNP	N-NITROSODI-NPROPYLAMINE	79.			_			29.4			11
PMOCRE	O-CRESOL	41. 91.						0.0		1.5	
PAEPAR	PARATHION ETHYL	91. 65.						26.1		1.4	
X3PCPH PNPHEN	PENTACHLOROPHENOL PHENANTHRENE	88.						0.0		0.0	
PMPHEN	PHENOL	40.			8 17						
PNPYR	PYRENE	87.									
PMPCMC	P-CHLORO-M-CREOSOL	86.		-	8 66			0.	0 0	0.0	11
PMPCRE	P-CRESOL	1.		-	8 1						
POTOC	TRI-O-CRESYL PHOSPHATE	92.			8 66	97.	1 0	0.	0 0	0.0	11

TABLE 5-5b)
SUMMARY OF RECOVERY OF MATIVE DIOXIN/FURAN COMPOUND SPIKES FROM DISTILLED MATER SAMPLES

			Sampl								H	
	Compound Name	AVG.	STD. DEV. OF	DATA	USED DATA	USED DATA	DATA <30% REC	DATA <30% REC	DATA >150% REC	DATA >150° REC	110	QA ode
P97CDD	HEPTACHLORODIBENZODIOXIN	79.0	26.7	12	10	83.3	0	0.0	0	0	H-	1
P97CDF	HEP TACHLORODI BENZOFURAN	101.0	39.7	12	11	91.7	0	0.0	1	8.33	H	1
P96CDD	HEXACHLORODIBENZODIOXIN	62.0	21.5	12	8	66.7	0	0.0	1	8.33	Π	2
P96CDF	HEXACHLOROD I BENZOFURAN	80.0	28.9	12	11	91.7	0	0.0	0	0	П	1
298CDD	OCTACHLORODIBENZODIOXIN	83.0	36.8	12	10	83.3	0	0.0	0	0	Π	1
P98CDF	OCTACHLORODIBENZOFURAN	78.0	26.4	12	11	91.7	0	0.0	0	0	П	1
P95CDD	PENTACHLORODIBENZODIOXIN	62.0	21.5	12	8	66.7	0	0.0	0	0	Π	2
P95CDF	PENTACHLORODI BENZOFURAN	71.0	24.7	12	11	91.7	0	0.0	0	0	11	1
P94CDD	TETRACHLORODIBENZ OD IOXIN	66.0	21.9	12	10	83.3	1	8.3	0	0	11	1
P94CDF	TETRACHLORODIBENZOFURAN	54.0	31.4	12	7	58.3	2	16.7	0	0	H	2

TABLE 5-5c)
SUMMARY OF RECOVERY OF NATIVE PESTICIDE/HERBICIDE COMPOUND SPIKES FROM
DISTILLED WATER SAMPLES

		Recovery Data Obtained In Distilled Water Samples Spiked With Native Compounds									
Compound	Compound Name	AVG.	ŠTD.	$\overline{}$	-	1	-	-	-	1	H H (
Code		1 R	DEV.	DATA	USED	DSED	DATA	DATA	DATA	DATA	110
		• •	OF			DATA		<301		>150%	
			₹ R		•		REC	REC	REC	REC	ii H
X2124	1, 2, 4-TRICHLOROBENZENE	27.8	18.4	63	31	49.2	13	20.6	0	0.00	
P3245T	2, 4, 5-TRICHLOROPHENOXYACETIC ACID	13.0	45.8	46	1	2.2	45	97.8	0	0.00	11
P324D	2, 4-DICHLOROPHENOXYACETIC ACID	2.4	4.9	46	1	2.2	45	97.8	0	0.00	H
PIALDR	ALDRIN	80.6	87.4	63	54	85.7	8	12.7	0	0.00	\prod
P1 BHCA	Alpha-BHC	77.8	32.1	63	50	79.4	4	6.3	1	1.59	11
P1CHLA	Alpha-CHLORDANE	85.8	39.2	61	50	82.0	4	6.6	3	4.92	П
P1BHCB	Beta-BHC	76.3	30.0	63	52	82.5	- 4	6.3	1	1.59	Π
POCAPN	CAPTAN	57.0	59.1	48	21	43.8	18	37.5	1	2.08	11
P1BHCD	Delta-BHC	72.9	40.6	62	43	69.4	11	17.7	1	1.61	11
PIOIEL	DIELDRIN	64.7	39.1	55	32	58.2	14	25.5	1	1.82	11
Plenda	ELDRIN ALDEHYDE	48.6	29.8	21	8	38.1	6	28.6	0	0.00	11
PLENDI	ENDOSULF AN I	66.4	44.1	55	34	61.8	17	30.9	4	7.27	11
P1END2	ENDOSULFAN II	52.2	37.2	62	41	66.1	21	33.9	0	0.00	11
P1 ENDS	ENDOSULFAN SULPHATE	55.8	40.7	65	37	56.9	20	30.8	0	0.00	11
PIENDR	ENDRIN	55.3	40.8	62	31	50.0	23	37.1	1	1.61	\prod
P1BHCG	Garma-BHC	65.8	33.0	62	41	66.1	10	16.1	1	1.61	\prod
PICHLG	Garma-CHLORDANE	84.6	41.7	62	48	77.4	10	16.1	3	4.84	[]
PIHEPT	HEPTACHLOR	20.3	19.5	63	5	7.9	50	79.4	0	0.00	11
PIHEPE	HEPTACHLOREPOXIDE	63.8	38.2	57	35	61.4	16	28.1	1	1.75	П
X2HC8	HEXACHLOROBENZENE	64.8	27.1	63	40	63.5	6	9.5	1	1.59	11
X1 HCBD	HEXACHLOROBUTADIENE	29.7	14.5	62	3	4.8	29	46.8	0	0.00	11
X1HCCP	HEXACHLOROCYCLOPENTADIENE	42.3	44.4	43	10	23.3	23	53.5	3	6.98	Π
X2HCE	HEXACHLOROETHANE	28.3	13.2	63	2	3.2	34	54.0	0	0.00	11
PIDMDT	METHOXYCHLOR		35.7	60	46	76.7	17	28.3	- 1	1.67	11
PIMIRX	HIREX	63.0	51.0	63	51	81.0	4	6.3	. 0	0.00	11
PIPMIR	HIREX PHOTO	64.0	41.1	61	33	54.1	17	27.9	1	1.64	11
P10CHL	OXYCHLORDANE	84.7	50.8	62	37	59.7	8	12.9	8	12.90	H
PIPCET	PCB, TOTAL			0							H
POPCNB	PCNB	65.5	27.1	58	39	67.2	5	8.6	1	1.72	11
PIPPDD	PP-DDD	90.4	47.2	62	46	74.2	9	14.5	7	11.29	11
PIPPDE	PP-DDE	78.7	37.9	59	43						11
PIPPDT	PP-DDT	63.8	65.1	62	34	54.8	21	33.9	7		H
P3SILV	SILVEX	4.9	9.7	46	0	0.0	44	95.7	0	0.00	
PISTRO	STROBANE			0							Π
PITOX	TOXAPHENE			0							П

TABLE 5-5d)
SUMMARY OF RECOVERY OF NATIVE VOLATILE ORGANIC COMPOUND SPIKES FROM DISTILLED
WATER SAMPLES

		Recovery Data Obtained in Distilled Water Samples Spiked With Native Compounds									
Compound Code	Compound Name	AVG. % R	STD. DEV. OF	DATA AVE.		USED DATA		BATA <30% REC		% DATA >150% REC	
X1111T	1,1,1-TRICHLOROETHANE	87.0	24.0	28	25	89.28	1	3.6	0		1
X11122	1,1,2,2-TETRACHLOROETHANE	80.0	19.0	27	26	96.29	0	0.0	0	0.0	1
X1112T	1,1,2-TRICHLOROETHANE	86.0	27.0	28	24	85.71	1	3.6	1	3.6 1	1
X111CE	1,1-DICHLOROETHANE	92.0	25.0	27	23	85.18	0	0.0	2	7.4	1
XIDCLE	1,1-DICHLOROETHENE	84.0	23.0	26	24	92.30	0	0.0	0	0.0	1
X212CB	1,2-DICHLOROBENZENE	91.0	44.0	27	24	88.88	0	0.0	1	3.7	1
X112CE	1,2-DICHLOROETHANE		22.0	27		92.59	1	3.7	0	0.0	1 1
X112CP	1,2-DICHLOROPROPANE		22.0	27		96.29	0	0.0	0	0.0	1 1
X213CB	1,3-DICHLOROBENZENE		23.0	27		96.29	Ō	0.0	Ō	0.0 [,
X214CB	1,4-DICHLOROBENZENE		22.0	27		96.29	Ō	0.0	0	0.0	
B10CTE	1-OCTENE		32.0	25	23	92	Ô	0.0	2	8.0 1	
			28.0	17		94.11	0	0.0	1	5.9 1	
PM2CEE	2-CHLOROETHYLVINYLETHER			•			•		-	11.5	
X2CPPE	3-CHLOROPROPENE		49.0	26		73.07	1	3.8	-		
x23CTO	3-CHLOROTOLUENE	89.0	11.0	19	18	94.73	0	0.0	0	0.0	
X1ACRO	ACROLEIN										1
X1 ACRY	ACRYLONITRILE										1 3
K1ACTO	Alpha-CHLOROTOLUENE	82.0		18		88.88	2	11.1	0	0.0	
B2BENZ	BENZENE	101.0	42.0	27		85.18	1	3.7		11.1	
B2BDCL	BROMODICHLOROBENZENE	83.0	18.0	12	11	91.66	0	0.0	0	0.0	,
X1BDCM	BROMODICHLOROMETHANE	86.0	23.0	28	25	89.28	0	0.0	0	0.0	
X1BETH	BROMOETHANE	79.0	18.0	25	24	96	0	0.0	0	0.0	1
BRFLB	BROMOFLUOROBENZENE										2
X1 BROM	BROMOFORM	83.0	19.0	28	28	100	0	0.0	0	0.0]
XICTET	CARBON TETRACHLORIDE	79.0	25.0	27	23	85.18	0	0.0	1	3.7	1
X2CBEN	CHLOROBENZENE	88.0	16.0	28	27	96.42	0	0.0	0	0.0	1
X1CDBM	CHLORODI BROMOMETHANE	93.0	19.0	28	26	92.85	0	0.0	0	0.0	1
X1 CHLE	CHLOROETHANE	89.0		14	11	78.57	0	0.0	1	7.1	1
X1CHLO	CHLOROFORM	99.0	35.0	28	25	89.28	0	0.0	3	10.7	i 1
X1CHLM	CHLOROMETHANE	86.0		17		0	2	11.8	3	17.6	1 2
X1CDCE	Cis-1, 2-DICHLOROETHYLENE	88.0		26	25	96.15	0	0.0	0	0.0	
X113DP	Cis-1,3-DICHLOROPROPENE	87.0		26		96.15	Õ	0.0	0	0.0	
X1DCFM	DICHLORODIFLUOROMETHANE	79.0		21		61.90	1	4.8	1	4.8	
XIDCIM XIDCIM	DICHLOROMETHANE	100.0		28		82.14	1	3.6		10.7	
				24	24	100	0	0.0	0	0.0 1	,
Eldiee	DIETHYL ETHER	97.0		28			0	0.0	0	0.0	
B2EBNZ	ETHYLBENZENE	93.0				96.42	-				
B1 HE XA	HEXANE	103.0		28	21	75	0	0.0	0		, -
LIHEX	HEXANOL	66.0		3		66.66	0	0.0	0	0.0	
B2MPXY	M-, and P-XYLENES	94.0		26	26	100		0.0	0	0.0	
B20XYL	O-XYLENE		20.0	20	20	100	0	0.0			
B2STYR	STYRENE	91.0		19	19	100	0	0.0	0	0.0	
XITETR	TETRACHLOROETHYLENE		20.0	27		96.29	0	0.0	0	0.0	
B2TOLU	TOLUENE		26.0	28		92.85	0	0.0	1	3.6	
X113DR	Trans-1,3-DICHLOROPROPENE	100.0		24		95.83	0	0.0	2	8.3	,
XITRIC	TRICHLOROETHYLENE	87.0		27		96.29	1	3.7	0	0.0	
X1TCFM	TRICHLOROFLUOROMETHANE	85.0		21	21	100	0	0.0	0	0.0	
X1T12D	TR-1,2-DICHLOROETHYLENE	82.0		20	18	90	0	0.0	0	0.0	
Blvbr	VINYL BROMIDE		24.0	21		95.23	0	0.0	0	0.0	
X1VCL	VINYL CHLORIDE	64.0	45.0	11	2	45.45	1	9.1	1	9.1	1 2

The above QA/QC codes were used by the MOE to evaluate the applicability of the data, as follows:

QA/QC Code	Data Application					
0, 1	Result can be used quantitatively.					
2	The result can be used to confirm either the presence or absence of the contaminant, but may not be used quantitatively.					
3	If the compound was detected in a sample stream, its presence can be confirmed and the reported concentration is a minimum. However, if it was not detected, its absence cannot be confirmed.					
4	If the compound was not detected in a sample stream its absence can be confirmed. However, if it was detected, its presence cannot be confirmed.					
5	Neither the absence nor presence of the com- pound detected or not detected in a sample stream can be confirmed, ie. no conclusions may be made.					

The above criteria were applied to all of the contaminants analyzed. The majority of contaminants fell into criteria 1, 2 and 3. Only one contaminant (bis-2-ethylhexyl phthalate) fell into criteria 4 and the results for this compound were previously invalidated using the method blank criterion. There were no contaminants which fell into criteria 5.

5.1.7 MOE LSB Spiking

Duplicate samples were sent from the field to MOE LSB for native compound spiking before being sent to the contract laboratory for analysis, as described in Section 3.2.

The results from these tests were used for observation purposes and were not used for quality control or quality assurance purposes in this study. These results are presented in a separate report by the MOE LSB (Ref. 6).

5.2 <u>Individual WPCP Reports</u>

5.2.1 Background Data

Individual plant background data that was collected for the study included plant historical (1981 - 1985) performance summaries, raw water sources and estimated quantities, premonitoring operational data and design information.

Appendix A contains a sub-appendix for each plant in the study, containing (where available) the above background data.

5.2.2 Sampling Program Data

The results of the sampling program contaminant analyses were summarized in individual reports prepared for each plant. Each individual plant report consists of a number of tables, one for each stream sampled at the plant, including raw sewage, final effluent (primary, secondary or lagoon), raw sludge and treated sludge. If there was a recycle stream, an additional table presents this analytical data. Also, the raw sewage results presented are after the recycle contribution in terms of flows and contaminant concentrations has been subtracted.

The individual plant tables for each stream summarize the analytical data for each compound using the following parameters:

- o Compound name
- o Compound code
- o QA/QC code (Section 5.1.2)
- o Number of samples analyzed
- o Number of samples where compound was detected
- o The frequency of detection of the compound in all samples analyzed
- o The maximum concentrations analyzed

In addition, two statistical parameters describe the results; the geometric mean and spread factor. For the purpose of calculating the geometric mean and spread factor in cases where the analytical result was below the associated DL, the value below the DL was assumed to be one half of the DL.

For purposes of comparison, individual plant analytical summary tables include results for all of the plants (global) for a specific stream type.

The individual plant reports containing summary analytical data table for each stream are presented in Appendix A.

5.3 Summary of Sampling Program Results

5.3.1 Data Presentation

In order to satisfy the objectives of this study, it was necessary to summarize the analytical data on a combined WPCP or global level.

The global data base for a particular sample type was made up of all the data obtained from the analysis of all relevant samples at all WPCPs. For the purposes of these summaries, each sample (24 hour composite or 5 day composite) was considered independent of the number of samples taken at the plant or the number of sampling periods at the plant.

A global summary table was prepared for each of the following sample types:

- Raw sewage (corrected for the effects of included recycle streams)
- o Primary effluent
- o Secondary effluent
- o Lagoon effluent
- o Tertiary effluent
- o Raw sludges
- o Treated sludges

Each table includes the following:

- o Compound code
- o Compound name
- o QA/QC Code (Section 5.1.2)
- o Number of samples analyzed for the compound
- Number of samples in which the compound was detected
- o The frequency of detection of the compound in all samples
- o The maximum concentration analyzed
- o The minimum concentration above the DL

- o The number of plants at which the compound was analyzed
- o The plant prevalence ie. the percentage of the total number of plants where the compound was detected in at least one sample

In addition, global geometric means and spread factors were calculated, based on the assumptions described in subsection 5.2.2 for values less than the DL.

Also included in the summary tables for liquid streams (ie. raw sewage and effluents) is the compound DL. As previously discussed, this value occasionally varied during the laboratory analyses within the stream type depending on a number of factors. The DL values presented in the summary tables are the limits for over 90 percent of the samples in a stream type. For approximately 10 percent of the samples the analytical laboratory was able to achieve reliable results below those DLs. This will explain the reason that in some cases the minimum reported concentrations presented are lower than the "typical" DL.

For sludges, the DLs used in analyses were based on the liquid sludge sample analyses. Since the contaminant concentrations presented for sludges are on a dry weight basis, the DLs cannot be used for comparative purposes, and are therefore not presented.

5.3.2 Contaminants Not Detected in Any Sample Type

Table 5-6 lists those compounds that were never detected at concentrations above the DLs in any liquid or sludge sample at any of the 37 WPCPs sampled. The list has been partitioned into compounds that are confirmed as not detected and compounds which on the basis of QA/QC results cannot be confirmed as not detected.

In total, 34 compounds were never detected in any sample type, 4 of these were not confirmed. Of the total number, 17 were base neutral and acid extractable compounds, 13 were volatile organic compounds, 3 were pesticide and herbicide compounds and 1 was Tetrachlorodibenzodioxin. There are no metals on this list.

5.3.3 Summary of Contaminants in Raw Wastewater

Table 5-7(a) presents the compounds that were not detected above the DL in any raw wastewater sample. A total of 59 compounds were not detected, including 4 that were not confirmed. Also indicated in this Table are all compounds that were not detected in any stream type (Table 5-6).

TABLE 5-6 - GLOBAL SUMMARY OF CONTAMINANTS NOT DETECTED IN ANY STREAM

	CONFIRMED		NOT CONFIRMED
CONTAMINANT	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS		
2ATRA	ATRAZINE	PMPCRE	P-CRESOL
4DIAZ	DIAZINON		
4EPAR	PARATHION ETHYL	l.	
4MALA 4MPAR	MALATHION METHYLPARATHION		
M24NP	24-DINITROPHENOL		
MANAA	ALPHA-NAPHTHYLAMENE		1
MBNAA	Beta-NAPHTHYLAMINE		
N2CNA	CHLORONAPHTHALENE		
NACNE	ACENAPHTHENE	!	
NDAHA	DIBENZO(4,b)ANTHRACENE	1	
NGHIP NINP	BENZO(g,b,i)PERYLENE IDENO(1,23-cd)PYRENE	1	i
	DICHLORAN	1	
odich otoc	TRI-O-CRESYL PHOSPHATE		
3245	2,4,5-TRICHILOROPHENOL		
	DIOXINS AND FURANS		
94CDD	TETRACHLORODIBENZODIOXIN		
	PESTICIDES, HERBICIDES, PCBS		
1STRO	STROBANE	POCAPN X1HCBD	CAPTAN HEXACHLOROBUTADIENE
	VOLATILES		
11 VBR M2CEE (11122 (11127 (1BETH (1BROM (1CHLE (1CHLM	VNYL BROMDE 2-CHLOROETHYLVINYLETHER 1,1,2,2-TETRACHLOROETHANE 1,1,2-TRICHLOROETHANE BROMOFINANE BROMOFINANE BROMOFINANE CHLOROETHANE CHLOROMETHANE TR.1,2-DIGLOROETHYLENE	XIACRY	ACRYLONITRILE
CITCEM CIVCL CICCEPTE	TRICHLOROFLUOROMETHANE VDYL CHLORIDE 3-CHLOROPROPENE		
	-		

	CONFIRMED		NOT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	METALS AND CYANIDE		
BEUT	BERYLLIUM, UNFILT. TOTAL		
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS		
P2AMET	AMETRYNE	PMPCRE	P-CRESOL*
P2ATRA P4DIAZ	ATRAZINE* DIAZINON*	ĺ	
P4DIAZ P4FPAR	PARATHION ETHYL*	1	
PIMALA	MALATHION*	- 1	
P4MPAR	METHYLPARATHION*	1	
PM24DT	2.4-DINTTROTOLUENE	i	
PM24NP	24-DINTTROPHENOL*	1	
PMANAA PMBNAA	ALPHA-NAPHTHYLAMINE® BETA-NAPHTHYLAMINE®	- 1	
PMDPE	DIPHENYL ETHER	1	
PN2CNA	CHLORONAPHTHALENE*	- 1	
PNACNE	ACENAPHTHENE*	- 1	
PNACNY	ACENAPHTHYLENE	1	
PNANTH PNBAP	ANTHRACENE BENZO(A)PYRENE	1	
PNBAP PNBIPH	BIPHENYL	- 1	
PNCHRY	CHRYSENE		
PNDAHA	DIBENZO(A,H)ANTHRACENE®	1	
PNGHIP	BENZO(G,H,I)PERYLENE*	1	
PNINP PODICH	IDENO(1,2,3-CD)PYRENE®	1	
POTOC	TRI-O-CRESYL PHOSPHATE*	1	
X3245	2,4,5-TRICHLOROPHENOL®		
	DIOXINS AND FURANS		
P94CDD	TETRACHLORODIBENZODIOXIN*		
P95CDD	PENTACHLORODIBENZODIOXIN	1	
P95CDF P96CDD	PENTACHLORODIBENZOFURAN HEXACHLORODIBENZODIOXIN	- 1	
P96CDF	HEXACHLORODIBENZOFURAN	1	
P97CDD	HEPTACHLORODIBENZODIOXIN	1	
P97CDF	HEPTACHLORODIBENZOFURAN		
	PESTICIDES, HERBICIDES, PCBS		
POPCNB	PCNB	POCAPN .	CAPTAN*
PIENDA	ELDRIN ALDEHYDE	X1HCBD	HEXACHLOROBUTADIENE®
PISTRO PITOX	STROBANE* TOXAPHENE	1	
	VOLATILES		
BIOCTE	1-OCTENE	XIACRY	ACRYLONITRILE*
BIVBR	VINYL BROMIDE*	1	
E1DIEE PM2ŒE	DIETHYL ETHER 2-CHLOROETHYLVINYLETHER*	1	
X11122	1,1,22-TETRACHLOROETHANE*		
X1112T	1,1,2-TRICHLOROETHANE®	1	
X113DR	TRANS-1_3-DICHLOROPROPENE	1	
XIACTO	ALPHA-CHLOROTOLUENE	ı	
X1BETH X1BROM	BROMOFTHANE* BROMOFORM*	1	
X10HLE	CHLOROETHANE*	1	
X1CHLM	CHLOROMETHANE*	1	
XIDCFM	DICHLORODIFLUOROMETHANE	1	
X1T12D X1TCFM	TRI-1,2-DICHLOROETHYLENE*		1
VIICUM	TRICHLOROFLUOROMETHANE®		
X1VCL	1,3-DICHLOROBENZENE		1
X213CB	1,4-DICHLOROBENZENE		1
X213CB X214CB		I	
X213CB X214CB X2CBEN	CHLOROBENZENE 3.CHLOROPENDENE	i	
X1VCL X213CB X214CB X2CBEN X2CPPE	CHLOROBENZENE 3-CHLOROPROPENE		
X213CB X214CB X2CBEN	CHLOROBENZENE 3-CHLOROPROPENE*		
X213CB X214CB X2CBEN	CHLOROBENZENE 3-CHLOROPROPENE*		
X213CB X214CB X2CBEN	CHLOROBENZENE 3-CHLOROPROPENE*		
(213CB (214CB (2CBEN	CHLOROBENZENE 3-CHLOROPROPENE*		

[.] NOT DETECTED IN ANY STREAM TYPE AT ANY PLANT

A summary of the compounds that were detected in any raw sewage sample (all WPCPs) is presented in Table 5-7(b). A total of 85 organic contaminants, 14 metals and cyanide were detected at least once in raw sewage samples. However, only 7 metals (Al, Sr, Zn, Hg, Cu, Ni and Cr), 2 base neutral and acid extractable compounds (M-cresol and phenol) and two pesticides and herbicides (2,4-Dichlorophenoxyacetic acid and gamma-BHC) were found in the raw sewage streams at more than 50 percent of WPCPs. The most prevalent volatile organic compounds were detected in raw sewage at fewer than 40 percent of the 37 plants, and the most prevalent dioxin/furans at fewer than 11 percent of plants.

All detected volatile compounds, dioxin/furans compounds and all but the 2 pesticides and herbicides and 2 base neutral and acid extractable compounds (mentioned above) were detected in less than 20 percent of the samples. Metals were most frequently detected contaminant group.

5.3.4 Summary of Contaminants in Primary Effluents

Table 5-8(a) presents the contaminants that were not detected in any primary effluent samples from any of the 7 primary treatment plants. There were a total of 109 compounds not detected, including 7 that were not confirmed. Also indicated in the Table are the 34 compounds that were not detected in any sample at any plant.

A summary of the parameters detected in any primary effluent is presented in Table 5-8(b). A total of 33 organic contaminants, 13 metals and cyanide were detected at least once in the primary effluents.

Four of the 6 base neutral and acid extractable compounds, 4 of the 15 pesticides and herbicides, and 4 of 10 volatile organic compounds were detected in at least 3 of the 7 primary WPCPs. Metals were the most prevalent contaminant with 12 metals detected at at least 3 plants. Dioxin/furan compounds were only detected at 2 plants.

As noted, metals were the most frequently detected contaminants. Six metals (Zn, Sr, Hg, Al, Cr, Cu) were detected in greater than 60 percent of all primary effluent samples. Only one base neutral and acid extractable compound (M-cresol) two pesticides and herbicides (gamma-BHC and 2,4-Dichlorophenoxyacetic acid) and 1 volatile organic compound (Tetrachloroethylene) were present at least 40 percent of samples. The most frequently detected dioxin compound (Octachlorodibenzodioxin) was detected in only 25 percent of the samples.

CONVENTIONAL BOC DISS NNTKUR NITR								FLANIS	TRE Y.	MEAN			> DI.	
DOC NNTKUR	IONAL													
NNTKUR	DISSOLVED ORGANIC CARBON	mgA.	0 (112	171	100.0	37	37	1000	22.39	181	184 00 24 25	05.1	0.0
	CLOCKHACONCAN	III.		275	212	100.0	3. 5	37	100.0	969	1 05	9.27	60.9	0.
PNH PNH	PLIOSPHORUS.UNFILT TOTAL	mg/l.	0	248	248	100.0	30	30	100.0	5.18	1.51	17 90	0.51	0.0
NNITTER	AMMONIUM, TOTAL, FILT REAC.	mg/	0	274	27.5	9 66	37	37	1000	15.37	1 69	43.10	4.55	0.5
BOD5	BOD, S DAY -TOTAL DEMAND	mg/L	0	500	267	9.66	75	31	100.0	57 061	193	807.00	9 5	0 .
KSP	RESIDUE, PARTICULATE	Age.	0	992	267	9.6	6 :	33	100.0	126.88	193	00700	010	2.5
COD	CHEMICAL OXYGEN DEMAND	E.	0 0	82°	560	7.66	37	, s	0001	100 84	701	259 00	24.62	0.0
RSPI.OI	RESIDUE PARTOSS ON IONE	J.	0 (\$ 3	2 :	4 5	2 :	9 5	1000	100 84	1.76	200	70.87	5 6
NNO 2FR PIENOL NNO 1FR	MIKHEFULL MACT. PHENOLICS (4AAP) MIRATES, TOFAL FULT REAC.			8 2 8	222	13.5	2 2 2	3.23	37.8	0.31	205	15 01	0.058	0.50
METALS A	METALS AND CYANIDE													
SRUT	STRONTIUM, UNFILT. TOTAL.	Jan.	0	318	319	7:66	37	37	100.0	370.70	2.14	2250 00	00:09	10.00
כתפד	COPPLR UNFILT TOTAL	ug/L	0	84	49	0.86	X :	5 5	1.76	11000	977	000000	8 9	20.00
IN I	ZINC,UNI-ILT-TOTAL	J. 2	0 0	313	375	2 4	3/	2,6	9 9	0031	211	2000	200	30
1921	MERCURY, UNFILL FOLAL ALTMANTMENTER TROTAL	, e	-	5 7	122	0 0 0	, e	, E	97.3	100010	265	22957.80	09 101	Š
CBIT	CHROMITM INCH T TOTAL	7 6	0	237	322	73.6	33	37	89 2	51 10	344	820 00	10 00	10
NH.T	NICKEL, UNIT L'OTAL.	2	0	103	322	32.0	07	37	<u>x</u>	38 80	2.70	1469 90	20 00	10.0
CCNFUR	CYANIDE PREEJUNFILT REAC.	Les.	0	82	271	30.3	13	37	32.4	1 90	× × 0	00 00061	300	-
AGUL	SILVER, UNFILT TOTAL	ug/l.	0	82	321	22.6	8	37	757	10 40	2.55	90.06	8 20	01
COLT	CORALTUNIST TOTAL	ug/l.	0 0	2, 42	322	555	31	37	858	9.30	2.51	259 20	3.00	10.5
DOLL T	LAD INNI TTOTAL	3 6		2 5	177	17.7	2 2	33	51.4	59 50	1.86	1203.00	00:00	30.0
MOUT	MOLYBDENUM LINER TOTAL	, Van	0	4	321	12.8	21	37	8 98	12.40	1.72	890.00	20 00	10.0
SEUT	SELENRUM, UNFILT TOTAL	ueA.	0	\$	308	9 -	2	37	5.4	17.30	207	80.00	30 00	ž
ASUT	ARSENIC, UNHILT TO FAL.	ug/l	0	3	308	10	-	37	77	16 80	183	00 09	00 09	Ř
BASE NEU	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS	POUNDS												
PMMCRE	M.CRESOL.	Man.	- ·	167	27.5	60.7	32	37	86.5	25.59	345	783.95	0 18	51
PMPHEN	PITENOL.	y v	7 -	5 7	27.5	12.4	67	7.	37.8	585	957	K2 90	0101	2 2
PNNAPI	NAPIGIALENE			2 2	275	2.8		37	21 6	5.37	147	46.90	10 30	01
PNPILEN	PHENANTHRENE	Ng.	-	7	275	5.6	4	37	108	517	1.35	39.30	2.20	10.0
PMOCRE	O-CRESOL	ug/l.	7	9	27.5	2.2	3	37	8	7.72	1.39	216.50	15 30	150
X3PCPI	PENTACHLOROPHENOL.	Ngu.	-	٠.	27.5	œ :	₹ (37	10.8	12.94	1.42	120 80	8 9	ล
PMDMP	DIMETRYL PRITIALATE	Na.	-	4 4	2/2	2 :	7 (37	4 4	2 5	1.37	20 20	10 00	2 0
PNHAN	A NORANITHENE	Van Van	7	4 ~	275	2 =	7 €	37	n &	12.65	1 29	53.30	32.05	2002
PMRZEM	BISCA CHIORETHANE	, V	١	, 7	27.5	0.7	2	37	5.4	\$ 09	1 38	106.70	47.70	100
PMB2NE	BIS (2 CTU OROMETTHY) JESTIER	ug/l,	7	2	27.5	0.7	2	37	5.4	7 61	1.34	101.50	39 40	150
PMNNP	N-NITROSO-DI-NI'ROPYL'AMINE	ug/L	_	2	27.5	0.7	2	37	5.4	5 09	137	103.90	39 00	10.0
PM24DP	2,4-DICH OROPHENOL.	Za.	-	-	27.5	9.0	-	37	2.7	12.57	1.29	7680	76 80	22
PM24MP	24 DIMETHYLMHENOL.	Ŋ,	٦.		275	9.0		37	27	12.54	1 27	33 90	33 90	23
PM26DT	2,6-DINITROTOLUENE	ug/l	- .		272	0.4		37	17	7 5	97 7	36.90	36.90	200
PM2NP	2 NITROPHENOL.	Ngu.	~ .	۰.	275	0 0		37	2.7	12.53	1.26	29 40	20 40	2 2
PM46DP	2-METHYLA 6-DINGROPHENOL	ng/J	2 .		275	0.4		37	17	12.57	1 29	79 40	79 40	2 :
PM4BPE	4. RROMOPHENYLPHENYLETHER	νgη.	- .		275	0.4	-	37	2.7	7 58	135	181.40	181 40	15.0

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PATER STATE OF THE PATER STATE	FAME FIRST FAM	NH,UO	FLUORISME	ug/L	_	_	275	04	-	37	2.7	\$ 02	1 28	24 50	24 50	0001
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OCTACILICARODIBENZAPIRAN By 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	DESTIRRINGUINES NY NY PARTICIPAS OF THE TOTAL CRODINES NY NY PARTICIPAS OF THE TOTAL CRODINES NY NY CAMANA INCIDENCYCLINE AND 18, 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ACDF	TERACTILORODIBLINGOLURAN	ng.	7	-	ž	· ·	-	3/	17	041	906	4 80	4 80	0.20
24-DICH CORONING VACTOR CCLUBANNI) Lagar 214 276 773 37 17 1000 011 372 260 000 declared by the control of the	2.4 DICTU GROUPLENDY WAY STITE AND WAY 1 214 276 577 37 17 1000 011 372 260 000 CONSTREMENTINES. PT. 85 17 17 1000 011 372 260 000 CONSTRUCTION WAY 1 214 276 17 17 17 17 17 17 17 17 17 17 17 17 17)8CDF	OCTACHLORODIBENZOFURAN	ης.	-	_	z	6	-	37	2.7	0.79	287	300	300	8
CAMANA HIKCHINACKACHIC ACU) ALFADICIU ROCPOLINICANCYCLINEANE) BATTONYCLICAN BA	CAMANI HICTORYCRIC ACTO) Well 1, 11, 2, 11, 2, 20, 11, 11, 11, 11, 11, 11, 11, 11, 11, 1															
Common High Decomposition	### CANANA HIGGINEA/CLINEA/NI) "g.f. 143 26 518 35 317 456 000 000 000 000 000 000 000 000 000 0	324D	2,4-DICH OROPHENOXYACI: FIC ACID	νg.		214	276	77.5	37	37	100 0	013	372	2.60	0000	0
Fig. 1 (1) ALL Fig. 1 Fi	Fig. 170 A.	BHCO	GAMMA BHC(IBXACIII.ORCYCLIIEXAN)		7	143	276	818	£ :	37	Z :	0.07	2.29	2.70	10.0	000
Colored Hart Col	1.24 HOLDS 1.24	OWC	METHOXYOLOR	, e		4	270	17.0	9 !	37	43.2	800	3.14	066	010	0.00
HITCH ROUGHYATHER WAY 1 32 20 112 13 37 30 00 124 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.	HICH GROWN ONE CYCLI HIXANE) B. W. 1 3 2 20 112 13 37 51 001 1548 0.20 0.23 113 113 113 113 113 113 113 113 113 1	E 2	PCB, TOTAL	, S	7 .	4.2	276	7 5 5	= :	3.5	400	900	16.7	4 50	800	000
SHIPMEND	BHITA BIRCIGIANACTI UNECCELLIANANE) ug/l 3 2 20 116 13 35 15 100	2124	1, 2, 4-TRICHLOROBENZINE	Ŋ,	•	35	270	12.7	2	37	40 S	100	2.48	7.20	700	0.0
243-YIKI MINIODENICAL MACTETIC ACID. 243-YIKI MICHIGANI MACTETIC ACID. 244-YIKI ORPHEROXYACETIC ACID. 245-YIKI ORPHEROXYACETIC ACID. 245-YIKI ORPHEROXYACETIC ACID. 247-YIKI ORPHEROXYACET	34. MAY STATEM CALLO DEPARTMENT CALLO MAY 1 28 270 101 15 37 46.55 0.0% 10.0%	BHCB	BETA-BIJC (BEXACIII ORCYCLEHEXANE)	2	_	32	270	9 [2	37	35.1	100	99 [1913	700	005
245-18470 OPPURENOX YACATIC ACID	245-1410 MINISTACTICACID wg/1 3 2 2 0 8 0 14 37 37 8 006 100 027 007 007 007 007 007 007 007 007 0	3511.V	SILVIEX	S	•	87	9/7	101	2	3/	5.04	900	. PA	8	800	010
HATTH HIGGINAXTELARATE WATER W	Figure F	32451	2.4.5-TRICLORIPHENOXYACTETIC ACID		٠.	77	0/7	0 :	7.	37	3/8	900	00	0.73	000	010
Figure F	STATISTIC PROPERTY STATIST	MIRCA	ALMA BITCHEAACTBARCTCH FIRAANS			9 :	0/7	8.	- (, ,	6 2	100	06.1	010	700	000
INTERCRIPTION INTERCRIPTIO	INTERPORTED	117DE	PP-DDE	,	_	2 :	0/7	5.5	,	3,	24.3	100	4	5.80	100	700
EIDAMILIANI U. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	HEANCHEACH WATER WATER TO THE	SON	ENDOSOLPAN SULPHALE	, m	- -	5	0/7	7	0 1	6	7 91	4 6	90 1	660	710	000
ENDONIJAVIII HETATORIANI M.	ENDOMIDANII ug/, 3 10 276 36 8 37 216 001 142 015 002 002 002 002 002 002 002 002 002 00	21 K B	IDS ACTILOROBINZENE	ď,	7	= '	0/7	0.4	_	3	6 81	10.0	1 39	010	700	0.07
HETACHLORIA WAY, 3 10 276 36 7 37 18 9 001 148 022 003 004 004 004 004 004 004 004 004 004	HETACHIOR HETA	1FND2	ENDOSULPAN II	ug/	~	0	276	3.6	**	37	21 6	100	142	013	0.02	005
PRODIT MARIA PARTICIORIANE ugl. 1 9 276 33 6 37 16 0 149 210 0	PARAMACILOMOMNIE ugl. 1 9 276 33 6 37 162 001 149 210 002 PP-DOT ugl. 1 9 276 29 7 37 189 004 149 210 002 AIPH JBHIN ugl. 1 7 276 29 7 37 189 004 158 006 007 MRIEX CHORNANIE ugl. 1 6 276 22 4 37 189 001 158 020 002 PENDIN ugl. 1 6 276 22 4 37 189 001 138 030 002 HENDRIN ugl. 3 5 276 18 4 37 189 001 139 033 002 HENDRIA LIBACIO RECECTOR OPERATION IN CONTROL RECEDITION AND INCOMPANIE ugl. 3 4 37 114 4 37 44 001 130 002 002 002 002 002	HIEPT	HEPTACHLOR	Ž,	9	10	276	36	1	37	6 81	000	1 48	D 22	003	0.02
PEDDIT USA, 15 1 20 20 31 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PEDDIT PAGE	OHO	GAMMA-CHLORDANE	ug/L	_	6	276	3.3	۰	37	16.2	001	1 49	2.10	0 02	0.02
DRIADHIN UP. 2 2 2 2 3 3 4 5 5 5 5 3 5 5 5 5 5	Designation	TOPPIT	PP-DDT	ug/l.	3	6	276	3.3	1	37	18.9	000	1 35	0 9 5	800	0 0
MRING TO PRIDANE W. 1 7 276 25 5 17 185 001 146 200 002 MRING W. 1 6 7 276 22 4 17 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	MRIATOMONDANE W.M. 1 7 276 25 5 37 115 00 1164 200 002 MRIATA THORPANE W.M. 1 6 276 22 4 77 108 001 138 000 002 FP.DDD W.M. 1 6 276 22 4 77 108 001 138 034 002 FP.DDD W.M. 1 7 276 18 4 77 108 001 134 025 002 FP.DDL W.M. 1 7 276 18 5 77 115 001 130 002 FP.DDL W.M. 1 7 276 18 5 77 115 001 130 001 FP.DDL W.M. 1 7 276 18 1 7 115 001 130 001 FP.DDL W.M. 1 7 276 18 1 7 115 001 130 001 FP.DDL W.M. 1 7 276 11 2 2 276 11 2 2 276 FP.DDL W.M. 1 7 276 11 2 2 276 FP.DDL W.M. 1 7 276 11 2 2 276 FP.DDL W.M. 1 7 276 FP.DDL W.M. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	IDIE!	NIHOTERG	ug/	7	20	276	2.9	7	37	18 9	0.01	1 28	0 0	0 02	0 02
MRICH MICHES WITH BLANCH MICHES	HERNY	AllDi	ALPHA CHLORDANE	ueA.	_	7	276	2.5	•	37	13.5	0.01	146	2.00	0.02	0.02
PEDIDIC PROPERTY OF THE PROPERTY OF THE PEDIDIC PROPER	PF-DDD PF-DD	MIRX	MIREX				276	2.2	٠ ٦	11	8 01	100	1 28	0.20	0.00	0 0
EMPRING MACCICIORNATORIANE W.M. 1 2 200 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	EADMIN E	COCKE	COVI BRI				2	,,	, ,			500	3.2	0.20	1000	
HIGACII DROCYCI OPENTADIE-HE WELL 3 5 70 11 5 17 115 010 1	HEACHIOROCYCI OPENIADIENE UGG 3 5 76 18 5 37 136 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 02 001 134 034 034 034 034 034 034 034 034 034 0	a Civilia	MOUNT			•	325	1 -	, -					,	500	
HEACH CHORCA TO PREVIABLE W. J. 3 2 26 18 5 31 135 010 130 030 012 HEACH CHORCA TO PREVIATION CONTINUED W. J. 3 276 18 5 31 135 010 130 030 002 002 002 002 002 002 002 002 0	HISACHIORENTALIDENE W. W. 1 1 1 1 1 1 1 1 1 1	MCM	ENDRIN		۰,	٠,	0/7	0		'n	901		* .	3 2	000	700
INDACTION Web 18 5 18 5 18 18 18 18	HINACHI (MORI HANE) LINDONILLANI UND. 3 5 76 18 5 37 115 001 126 009 002 HINACHI (MORI HANE) UND. 3 6 726 11 3 3 7 14 60 11 10 009 002 HINACHI (MORI HANE) UND. 3 7 7 84 001 12 009 002 OXYCHI ORINARI UND. 2 2 726 07 2 37 54 001 12 006 005 DRITA INTURKCHI (MORI CYCLI IRIXANE) UND. 1 726 00 1 1 7 00 005 MREA FINICIPAL OF UND. 3 7 7 001 12 006 005 MREA FINICIPAL OF UND. 3 7 7 001 13 005 005 MREA FINICIPAL OF UND. 3 7 7 001 13 005 005	1111	HEAACHLOROX YOLOPEN LADIENE	'n Na	•	0	9/7	*	'n	3	13.5	010	05.1	0.38	710	070
HEPTACHIONICATAN 1,4,1 1,2,6 1,1 1,3 1,4 0.01 1,10 0.01	NINONIALIANI	2110	HEXACHI OROL/ITIANE	Ž,	3	∽	376	æ 	∽	37	13.5	0.01	1 26	600	0 0 2	0 02
A DHIN HTACH OHIVAXDE	HPT/GFH 08H-YAXIDE	TOVEL	ENDOSCILIANT	Ž,	3	7	276	1.5	7	37	5.4	0 0 1	1 30	0.12	0 03	0.02
HEPTACHIOBRANE	HPTACHIOMERVADE: ug/l 2 276 07 2 37 54 001 119 003 002 002 OVCHIOMANE: ug/l 2 2 276 07 2 37 54 001 123 006 005 OVSTONOMANE: ug/l 2 2 2 76 07 2 37 54 001 123 006 005 OVSTONOMANE: ug/l 1 226 04 1 37 27 001 118 003 005 OVSTONOMANE: ug/l 2 1 276 04 1 37 2.7 001 118 003 003	MINE	ALDRIN	Lad.	_	•	276	-	3	37	8	001	1.21	000	0 0 2	0 02
OXYCHI ORDANI: u.g/l 2 2 776 07 2 37 54 001 123 006 005 U.g. 1 1 776 04 1 37 27 001 130 005 005 U.g. 1 1 776 04 1 37 27 001 130 005 005 U.g. 1 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	OXYCH ONDANE	HILP	HI-PTACHI OHI-IVANDA	0	,	,	376	0.7	, ~	11		100	1 10	100	000	000
10-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	DELTA WERTHER WEST OFFICE OFFI	01.503	OVYCH ODDANE		٠, ١	4 (2,4	5 6	٠,	, ;			2 :	500	100	700
DALLA BIK (DEKACHIKANE) UNT. 1 1 276 04 1 37 27 001 120 005	DELIA INTRUIXALII DARAYCI III 270 04 1 37 27 001 120 003 003 NINEX PROTO	100	OA TCHI ORDANE	2	,	7 .	0/7	0.7	7	3/	4	000	67	000	000	0.07
	MIREX PHOTO 48,1 2 1 276 0.4 1 37 2.7 0.01 118 0.03 0.03	HIED	DELLA BIRCHEXACIDADECYCLIBEXANE)	2	_	-	576	0.4	_	37	7.7	100	1 20	0 0 0	0.05	0.02

INANI	ONIANT CONTAMINANT NAME	ONITS O	UNITS QA/QC GLOBAL CODE # SAMPS. DET.	GLOBAL # SAMPS. TESTED	GLOBAL % FREQ. DET.	GLOBAL # PLANTS DET,	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GI OBAL GEO. MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONC.	GLOBAL MIN, CONC, > DI.	DET. LIMIT (DE)
VOLATILES	S:												
32MPXY	M., AND P.XYI ENES	Ngu	1 43	274	15.7	7	37	37.8	28 00	2 0 2	1700.00	3.80	40.00
B2EBNZ	ETHYL BENZENE	.von	1 30	274	110	=	37	29.7	23 50	1.75	1 200 00	3.50	40.00
CHOID	CHLOROFORM	√an	1 28	274	10 2	12	37	32.4	23 90	1.75	340 00	41 00	40 00
42OXYL	O-XYI ENE	ug/l.	1 25	274	9.1	6	37	24.3	22 47	1 56	570 00	4 40	40 0
CHILL	1,1,1-TRICHLOROETHANE	ug/L	1 21	274	7.7	7	37	6 81	23 18	1 74	440 00	43 42	40 0
CITRIC	TRICIB, OROFILIYI ENE	ug∕l.	1 15	274	5.5	9	37	16.2	22.59	1 82	9800 00	12 00	40.04
KLELLY	TETRACHLOROITHM ENE	ug/J.	1 12	274	4.4	7	37	6 81	21.51	1.53	3000 00	29 00	40.0
12STYR	STYRENE	√8n	1 9	274	33	4	37	8 01	21 40	1.39	1208.08	43 33	40.0
CDCLE	1,1-DICHLOROETHENE	√gn	1 7	274	2.6	•	37	13.5	20 55	1 28	220.00	10 00	40.00
12BDCL	BROMODICH LORORENZENE	ug/l.	1 2	274	0.7	2	37	5.4	20 55	112	55 00	40.00	40 OX
CLIZCE	1,2-DICTB_OROFTHANE	ug∕l.	1 2	274	0.7	7	37	5.4	20 26	117	120 00	120 00	40 0
CIBDCM	BROMODICHI OROMETHANE	√a,	1 2	274	7.0	2	37	5.4	30.10	1 10	130 00	18 00	0.00
CICDBM	CHLORODIBROMOMETHANE	ug⁄l.	1 2	274	0.7	2	37	5.4	20 16	110	67 00	26 00	40 0
COET	CARRON TETRACHLORIDE	√9n	1 2	274	0.7	2	37	5.4	50 19	112	00 66	57 00	40 04
110:X	IH-XANOL.	r⁄8n	2 1	274	0.4	-	37	2.7	1368 56	7 08	5000 00	2000 00	0.34
KIIICE	1,1-DICHLOROEHIANE	√an	_	274	0.4	_	37	2.7	50 19	116	250 00	250 00	400
(112CP	1,2-DICHLOROPROPANI-	√an	_	274	0.4	_	37	2.7	20 05	1 05	42 00	42 00	400
(113DP	CIS-1,3-DICH OROPROPENE	ľβn	-	274	0.4	-	37	2.7	29.24	===	40 00	40 00	9
TACRO	ACROLE IN	ug/J.	3	274	0.4	-	37	2.7	202 81	1 20	9200 00	9200 00	400 00
DCDCE	CIS-1,2-DICH OROFTHYLLINE	ug.V.	-	274	0.4	-	37	2.7	20 14	112	130 00	130.00	40 00
(212CB	1,2 DICHLOROBENZENE	ug/J.	_	274	0.4	-	37	2.7	20.05	1 05	42 00	42 00	400
23010	3 CH OBOTOL HAL	V					***						

	CONFIRMED	1	NOT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	METALS AND CYANIDE		
ASUT BEUT	ARSENIC,UNFILT.TOTAL BERYLLIUM,UNFILT.TOTAL		
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS		
P2AMET	AMETRYNE	PMPCRE	P-CRESOL*
P2ATRA P4DIAZ	ATRAZINE*		
P4DIAZ P4EPAR	PARATHION ETHYL*		
P4MALA	MALATHION*		
P4MPAR	METHYLPARATHION*		
PM24DP	2.4-DICHLOROPHENOL		
PM24DT	2,4-DINTIROTOLUENE	1	
PM24MP	2,4-DIMETHYLPHENOL		
PM24NP	2,4-DINTROPHENOL*	l	1
PM26DT	2.6-DINITROTOLUENE	}	1
PM2NP	2-NITROPHENOL	1	1
PM46DP PM4BPE	2-METHYL4,6-DINTTROPHENOL 4-BROMOPHENYLPHENYLETHER	1	
PM4CPE	4-CHLOROPHENYLPHENYLETHER	i	
PM4NP	4-NTTROPHENOL	1	
PMANAA	ALPHA-NAPHTHYLAMINE*	1	
PMB2EM	BIS(2-CHLORETHOXY)METHANE	1	
PMB2IE	BIS(2-CHLOROISOPROPYL)ETHER	1	
MB2NE	BIS-(2-CHLOROMETHYL)ETHER	1	i
PMBNAA PMDMP	BETA-NAPHTHYLAMINE* DIMETHYL PHTHALATE	1	
PMDPE	DIPHENYI, ETHER	1	
PMNITB	NTIROBENZENE	1	l .
PMNND	N-NTTROSO-DI-PHENYLAMINE	1	1
PMNNP	N-NTTROSO-DI-NPROPYLAMINE	1	
PMPCMC	P-CHLORO-M-CRESOL		
PN2CNA	CHLORONAPHTHALENE*	- 1	
PNACNE	ACENAPHTHENE®	1	
PNACNY PNANTH	ACENAPHTHYLENE ANTHRACENE	1	
PNBAA	BENZOLAJANTHRACENE	1	
PNBAP	BENZO(A)PYRENE		
PNBBFA	BENZO(B)FLUORANTHENE	l l	
PNBIPH	BIPHENYL	l l	
PNBKF	BENZO(K)FLUORANTHENE	l	
PNCHRY	CHRYSENE		
PNDAHA PNFLAN	DIBENZOXAH)ANTHRACENE®		
PNCHIP	BENZO(GH,DPERYLENE*		
PNINP	IDENO(1,2,3-CD)PYRENE*	ı	1
PNPHEN	PHENANTHRENE	1	
PNPYR	PYRENE	1	1
PODICH	DICHLORAN*	1	1
POTOC	TRI-O-CRESYL PHOSPHATE*		1
X3001O X3245	2-CHLOROPHENOL 2-4-5-TRICHLOROPHENOL		1
X3246	2.4.6-TRICHLOROPHENOL		1 '
X3PCPH	PENTACHLOROPHENOL	ı	
	DIOXINS AND FURANS		
			1
P94CDD	TETRACHLORODIBENZODIOXIN*		
PSCDD PSCDF	PENTACHLORODIBENZODIOXIN		1
96CDD	PENTACHLORODIBENZOFURAN HEXACHLORODIBENZODIOXIN	1	
%6CDF	HEXACHLORODIBENZOFURAN	1	
297CDD	HEPTACHLORODIBENZODIOXIN	1	
×97CDF	HEPTACHLORODIBENZOFURAN		
P98CDP	OCTACHLORODIBENZOFURAN		
	PESTICIDES, HERBICIDES, PCBS		
POPCNB	PCNB	POCAPN	CAPTAN*
PLALDR	ALDRIN	P1END1	ENDOSULFAN I
P1BHCD	DELTA-BHC(HEXACHLORCYCLHEXANE)	PIENDR	ENDRIN
PICHLA	ALPHA-CHLORDANE	XIHCBD	HEXACHLOROBUTADIENE*
PICHLG	GAMMA-CHLORDANE		
PIDIEL	DIELDRIN ELDRIN ALDEHYDE		1
	ELDRIN ALDEHYDE HEPTACHLOREPOXIDE	- 1	
PIHEPE PLOCHI.	OXYCHLORDANE		

[.] NOT DETECTED IN ANY STREAM TYPE AT ANY PLANT

	CONFIRMED		NOT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	PESTICIDES, HERBICIDES, PCBS		
PIPPDD PIPPDE PISTRO PITOX K2HCB	PP-DDD PP-DDE STROBANE* TOXAPHENE HEXACHLOROBENZENE VOLATILES ORGANIC		
BIVBR BIZBOCL EIDIEE LIHEX PM2CEE KIII1Z KIII1Z KIII1Z KIII1Z KIII1Z KIIIZOP KIII3DP KIIIDP KII	VONTLEROMDE* BROMODICHLOROBENZENE DETHYLETHER HEXANOL 2 CHLOROETHYLVNYLETHER* 11,2-ZTRIGGLOROETHANE* 1,2-DICHOROETHANE 1,2-DICHOROFROPENE CIS-1,2-DICHOROPROPENE RANS-1,3-DICHLOROPROPENE RANS-1,3-DICHLOROPROPENE ALPHA-CHLOROTOLUENE BROMOETHANE* BROMOFINANE CIS-1,2-DICHOROETHYLENE CHLOROBENANE CIS-1,2-DICHOROETHYLENE CHLOROMETHANE* DICHLOROBENTHYLENE THICHOROPOLUROMETHANE TRI-1,2-DICHOROETHYLENE* TRICHLOROBENZENE 1,3-DICHOROBENZENE 1,3-DICHOROBENZENE 1,3-DICHOROBENZENE 1,3-DICHOROBENZENE 1,3-DICHOROBENZENE 1,3-DICHOROBENZENE 3-CHLOROBENZENE 3-CHLOROPOPENE*	XIACRO XIACRY	ACRYLONITRILE*

TABLE 5-8 b.: GLOBAL SUMMARY OF CONTAMINANTS IN PRIMARY EFFICIENTS

CONTAM: INANT	CONTAMINANT NAME	UNITS QA/QC GLOBAL CODE # SAMISS. DET.	VQC 4	CODE # SAMPS. DEF.	GLOBAL # SANI'S. TESTED	GLOBAL % FRFQ. DET.	GLOBAL # PLANTS DET.	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GEO. GEO. MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONC.	GLOBAL MIN. CONC. > DL	DET. LIMIT (DL)
CONVENTIONAL	IONAL													
		•		,	ç	000	,	,	900	48.40	306	130.00	8 30	00
80D3	BOD, S DAY -LOTAL DEMAND	200		40	9 9	8			100.0	108 54	1.56	376 00	2008	8 8
9 5	DISCOLVED OBCANIC CARRON	Page 1		04	04	100.0	7	7	100.0	12.80	140	44 80	8 00	8 -
NNITE	AMMONE IN TOTAL FELT REAC.	Nam.		40	40	0 001	7	7	100 0	10 46	8	21 60	2.20	0.20
NNTKUR	NUROGEN TOT KJELUNFTOT	me/L	0	40	40	0 001	7	7	100 0	15.36	1 30	24 10	8 30	0 01
Ξ	(FOG(H+(CONCN))	,	0	40	40	1000	7	7	100.0	6.88	1 03	7 44	919	8
PPCT	PHOSIN HORUS, UNFILT TOTAL	mgA.	0	34	34	100.0	ş	•	1000	1.34	961	4 02	0 33	0 01
RSP	RESIDUE, PARTICULATE	mg/L	0	39	39	100.0	7	7	100.0	29 \$7	173	11 00	7 30	9
RSITOI	RESIDUR, PARLOSS ON IGNU	mg∕L	0	10	01	1000	7	7	100.0	28 16	195	76 80	12.80	000
TURB	TURBIDITY	mg/L	0	S	s	1000	-	-	100.0	17.58	1 35	28 00	11.50	0.25
PHINOL	PHENOLICS (4AAP)	me/L	0	7	40	17.5	4	7	57.1	900	201	700	110	010
NNO2FR	NITRITE FILT. REACT	me/L	0 0	4 4	0 4	0 0			14.3	0000	3.16	155	080	0 00
METALS	METALS AND CYANIDE													
11000	LA COLT TIMES IN COLUMN		_	48	84	1000	7	7	100 0	08 649	30	1300 00	10 00	20 00
SRIT	STRONTH MINER TOTAL	. L.		47	8.	6.76	7	7	100.0	304 90	283	1030 00	00 09	10.00
HGUT	MERCURY UNFILT TOTAL	ug/L	0	38	39	97.4	7	7	1000	0 0 0	2 4 2	0.36	0.01	0 0
A1.07	ALUMINUM, UNTIL'T TOTAL.	ug/L	0	46	48	958	7	7	1000	550 00	345	4800 00	100 00	2000
CULT	COPPER, UNFILT TOTAL.	ugA.	0	7	œ	87.8	7	7	000	18 20	185	800	000	0000
CRUZ	C) ROMICM, UNITE, T TOTAL.	ug/L	0 0	67 9	£ 4	9 5	o «		65.7	2.50	56	8 8	88	800
100	CORAL TUNES T TOTAL	Louis A		s =	4 4	22.9	•	, ,	85.7	6.50	1 58	20:00	10 00	10.00
MOLT	MOLYRDENUM UNFILT TOTAL	ug.A.	0	=	84	22.9	•	7	71.4	9 60	991	20 00	10 00	10 00
NICT.	NICKEL, UNFILT TOTAL	Ngu	0	10	84	8 02	4	7	1 72	8 70	2.86	140 00	10 00	10 00
PBUT	LEAD,UNITET TOTAL	ug/J.	0	6	48	8 8.	s	7	71.4	20 80	- 54	140 00	9000	8 9
AGUT	SILVER UNITL'T TOTAL	u _B A	0	œ e	84	167	4 (7	57.1	640	101	8 8	0000	200
CCNPUR	CYANIDE-REEUNFELT REAC.	. 6.		- -	40	, ,	n -		42.9	060	1 70	8 8	9 9	8 8
		2	,		:	1								
BASENEL	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS	MPOUNDS												
PMMCRB	M-CRESOI.	Lev.	_	*	39	46.2	•	7	71.4	3 90	297	32.40	4 30	3.00
PMBBP	BUTYLBENZYLMITHALATE	Na"	_	œ	39	20 \$	4	7	57.1	142	210	9 20	210	2.00
PMPIEN	PIENOI.	Na.	7	en i	36	12.8	m .	- 1	42.9	1.78	8 :	0.8	340	200
PNNAP	NAPITITALENE	Lg.		•	30	12.8	·n .	,	429	1	147	9 2	017	200
PMOCKE	O CRESOL. FAUORINE	U.S.A.	٧ -	7 -	2 2	2.6		, ,	14.3	1.05	1.38	8 2	7 80	2 08
		•												
Sittacin														
SKIIVOM	DICALING AND FURANG													
P98CDD P94CDP	OCTACH ORODINENZOPIOXIN TETRACHLORODINENZOPURAN		2	7 -	00 00	25 0 12 5	1	7	28 6	0 25 0 09	333	140	0.08	030
0.000	an at annual na tha annual tha an													
152	es, nerbit 10es, 14 bs													
PIBIICG	GAMMA BHC(th:XACH) ORCYCLIB:XANE) ug/L 2	EXANE) ug/L	7	58	9	72.5	9	7	85.7	0.02	2.28	60:0	001	0.0

a con			CODE	CODE # SAMPS. DET.	# SAMPS. TESTED	S FREQ. DET.	# PLANTS DET.	PLANTS	& PLANT PREV.	GEO. MEAN	SPREAD	MAX. CONC.	MIN, CONC,	DET. LIMIT (DL)
	PESTICIDES,HERBICIDES,PCBS													
324D	24-DICHLOROPHENOXYACETIC ACID	ue/L		11	40	67 5	۰	7	85.7	90:0	4 96	1.70	0.02	0.02
23SII.V	SB.VEX	L.	3	6	40	22.5	*	7	57.1	0.03	219	1.40	000	0 0
PCBT	PCB, TOTAL.	Ž,	7	7	40	17.5	7	7	9 87	0.03	3 06	0.45	0.03	0.0
3245T	24.5-TRICLORPHENOXYACETIC ACID	ug/	•	7	40	17 5	3	7	42.9	0 0	261	2.80	900	0.05
PIBHCB	BETA-BIJC (HEXCIB.ORCYCLJB:XANE)	Z,	-	9	40	150	7	7	987	0.01	1 30	0.02	0.01	100
X2JICE	HEXACID OROE TITANE	L.	3	٠,	40	12.5	_	7	14.3	000	3	0 03	0.05	0 0
PIBHCA	ALPHA-BIICGEXCHLORCYCLHEXANE)	7	-	7	04	\$ 0	-	7	14.3	0.01	1 58	0.05	003	0 0
PIEND2	ENDOSULI/AN II	L.		-	40	2.5	-	7	14 3	0.01	112	0 01	100	0.01
PIENDS	HNDOSULIAN SULPINATE	7	3	-	40	2.5	-	7	14 3	0 02	1 36	014	0.14	000
Ä	HEPTACHLOR	U.S.		-	40	2.5	-	7	14 3	0 0	1 25	005	0.02	0 0
PIMIRX	MIREX	Z,	_	1	40	2.5	-	7	14.3	0.01	1 39	900	000	0.01
Ħ	PP-DDT	υgΛ.	ŕ	-	40	2.5	-	7	14.3	0.02	131	011	0.11	000
CG	HEXACIU OROCYCL OPENTADIENE	Ng.		-	40	2.5	-	7	14.3	0.05	1 03	90:0	900	0.10
(2124	1,2,4-TRICHLOROBENZENE	Lgu V	3	-	04	2.5	-	7	14 3	100	1 33	0 03	0.03	10.0
ATILE	OLATILES OKGANIC COMPOUNDS													
GTETR	TETRACHI OROETHYLENE	ν.	~	17	38	55 3	۰	7	85.7	4 39	5.84	380 00	2.20	2 00
B 20 X YL.	O-XYLENE	u _K A.	-	13	38	34 5	9	7	85.7	1.94	3 0 5	39 00	270	2 00
32MPXY	M, AND P-XYLENES	Ľ.	-	10	38	26.3	9	7	85.7	1 83	342	83 00	2.20	500
XIIII	1,1,1-TRICHLOROETHANE	υg.	_	10	38	563	7	7	28 6	2.34	517	160 00	3.70	2 00
CICIET	CARBON TETRACH ORIDE	υg/L	_	6	38	23.7	-	7	14.3	2.05	3 84	\$3 00	8	2 00
KITRIC	TRICH BOROLTHYLENE	υg/L	-	7	38	18 4	3	7	42.9	171	380	4 20.00	6.40	2 00
B2F-HNZ	PARTICIPATION OF THE PROPERTY	U.B.	_	\$	38	13.2	2	7	982	1 29	2.03	17.00	2.20	2 00
CIDCLE	1,1-DICH OROETHENE	LKA.	_	3	38	19	-	7	14 3	1 43	3 44	110 00	20 00	2 00
BIOCIE	1-OCTENE	UKA.	_	_	38	2.6	_	7	14.3	1.58	1 36	10.00	00 01	900
dVTVC											2			

5.3.5 Summary of Contaminants in Lagoon Effluents

Table 5-9(a) presents the contaminants that were not detected in any effluent sample from either of the two lagoons sampled. In total, 133 contaminants were not detected, including 12 that were not confirmed. Also indicated in the Table are these 34 contaminants not detected in any sample at any WPCP.

Table 5-9(b) shows that in the lagoon effluents, only 7 organic compounds were detected, all from the pesticide/herbicide group. Only one herbicide (2,4-Dichlorophenoxy-acetic acid) was detected at both lagoons. Of the 10 metals detected, 9 were detected at both lagoons.

Only 3 organic compounds (2,4-Dichlorophenoxy-acetic acid, Methoxyclor and 1,2,4-Trichlorobenzene) were detected in more than 1 or 10 percent of the samples. Four metals (Al, Hg, Sr and Zn) were detected in more than 90 percent of the samples, while the other metals (Cd, Co, Mo, Ni, Cr, Cu) were detected in at least 17 percent of the samples.

5.3.6 Summary of Contaminants in Secondary Effluents

Table 5-10(a) presents the contaminants that were not detected in any effluent sample from any of the 28 secondary WPCPs. A total of 74 contaminants were never detected including 5 that were not confirmed. Also indicated in the Table are the 34 compounds never detected in any type of sample at any WPCP.

Data regarding contaminants detected in secondary WPCP effluents is presented in Table 5-10(b). Sixty-eight organic compounds, 14 metals and cyanide were detected in at least one secondary effluent sample. However, none of the base-neutral and acid extractable compounds or dioxins and furans were detected at more than 15 percent of the WPCP (4 plants).

Only 8 of the 23 compounds in the pesticide/herbicide group and 3 of the 17 volatile organic compounds were detected at more than 15 percent of the WPCPs. Metals were the most prevalent contaminants, with 11 metals detected at more than 50 percent of the WPCPs.

As noted, the most frequently detected contaminant group was metals, with 7 metals detected in greater than 50 percent of the secondary effluent samples. The most frequently detected base neutral and acid extractable compounds were found in less than 4 percent of samples; dioxin/furan compounds were found in less than 9 percent of samples, and volatile organic compounds were found in less than 10 percent of samples. Two pesticide/herbicide compounds (2,4-Dichlorophenoxyacetic and gamma-BHC) were detected in at least 70 percent of all the final effluent samples.

	CONFIRMED		NOT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	METALS AND CYANIDE		
	SILVER, UNFILT. TOTAL	i	
AGUT ASUT	ARSENIC LINFILT. TOTAL		
BEUT	BERYLLIUM, UNFILT. TOTAL		
CCNFUR	CYANIDE-FREE,UNFILT-REAC.		
PBUT	LEAD,UNFILT.TOTAL	1	
SEUT	SELENIUM, L'NFILT. TOTAL		
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS		
P2AMET	AMETRYNE	PMPCRE	P-CRESOL*
PZATRA	ATRAZINE*	1	
P4DIAZ	DIAZINON*		
P4EPAR	PARATHION ETHYL*	1	1
P4MALA D4MBAB	MALATHION* METHYLPARATHION*		
P4MPAR PM24DP	24-DICHLOROPHENOL		
PM24DT	2.4-DINTTROTOLUENE		
PM24MP	2,4DIMETHYLPHENOL		
PM24NP	2.4-DINTIROPHENOL*		
PM26DT PM2NP	2,6-DINTIROTOLUENE 2-NTROPHENOL		l
PMANP PMA6DP	2 METHYLA 6 DINTTROPHENOL		1
PM4BPE	4-BROMOPHENYLPHENYLETHER	1	1
PM4CPE	4-CHLOROPHENYLPHENYLETHER	1	
PM4NP	4-NTTROPHENOL		
PMANAA PMR2EM	ALPHA-NAPHTHYLAMINE * BIS(2-CHLORETHOXY).METHANE		
PMB2IE	BIS(2-CHLOROISOPROPYL)ETHER	l l	
PMB2NE	BIS-(2-CHLOROMETHYL)ETHER	1	
PMBBP	BUTYLBENZYLPHTHALATE	1	
PMBNAA	BETA-NAPHTHYLAMINE*		
PMDMP PMDPE	DIMETHYL PHTHALATE DIPHENYL ETHER		
PMMCRE	M-CRESOL		
PMNTTB	NITROBENZENE	1	
PMNND	N-NITROSO-DI-PHENYLAMINE		i
PMNNP PMOCRE	N-NITROSO-DI-NPROPYLAMINE O-CRESOL		
PMPCMC	P-CHLORO-M-CRESOL		1
PMPHEN	PHENOL		S
PN2CNA	CHLORONAPHTHALENE*		1
PNACNE	ACENAPHTHENE*	1	
PNACNY PNANTH	ACENAPHTHYLENE ANTHRACENE	1	1
PNBAA	BENZO(A)ANTHRACENE	1	
PNBAP	BENZO(A)PYRENE	1	
PNBBFA	BENZO(B)FLUORANTHENE	1	
PNBIPH PNBKF	BIPHENYL BENZO(K)FLUORANTHENE		1
PNCHRY	CHRYSENE		
PNDAHA	DIBENZO(A,H)ANTHRACENE®		
PNFLAN	FLUORANTHENE		
PNFLUO PNCLUD	FLUORENE BENZOG HIDBERYI ENE		
PNGHIP PNINP	BENZO(G,H,I)PERYLENE* IDENO(1,2,3-CD)PYRENE*		
PNNAPH	NAPHTHALENE	ŀ	
PNPHEN	PHENANTHRENE		I
PNPYR	PYRENE		1
PODICH POTOC	DICHLORAN* TRI-O-CRESYL PHOSPHATE*		1
X3001O	2-CHLOROPHENOL	1	1
X3245	2,4,5-TRICHLOROPHENOL*	1	
X3246 X3PCPH	2.4,6-TRICHLOROPHENOL PENTACHLOROPHENOL		
	DIOXINS AND FURANS		
P94CDD	TETRACHLORODIBENZODIOXIN*		
P94CDF	TETRACHLORODIBENZOFURAN		
P95CDD P95CDP	PENTACHLORODIBENZODIOXIN PENTACHLORODIBENZOFURAN	1	
P96CDD	HEXACHLORODIBENZOPUKAN HEXACHLORODIBENZODIOXIN	1	
P96CDF	HEXACHLORODIBENZOPURAN		
P97CDD	HEPTACHLORODIBENZODIOXIN		
P97CDF	HEPTACHLORODIBENZOFURAN		
	OCTACHLORODIBENZODIOXIN	1	i
P98CDD P98CDF	OCTACHLORODIBENZOFURAN		

CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT	CONTAMINANT NAME
	PESTICIDES . HERBICIDES. PCBS		
OPCNB	PCNB	POCAPN	CAPTAN* ENDOSULFAN I
PIALDR	ALDRIN	P1END1	ENDOSULFAN II
1 BHCA	ALPHA-BHC(HEXCHLORCYCLHEXANE)	P1END2 P1ENDR	ENDRIN
1 BHCB	BETA-BHC (HEXCHLORCYCLHEXANE)	PIPPDT	PP-DDT
PLBHCD PLCHLA	DELTA-BHC(HEXCHLORCYCLHEXANE) ALPHA-CHLORDANE	P3245T	2.4.5-TRICLORPHENOXYACETIC ACID
TOTES	GAMMA-CHLORDANE	P3SILV	SILVEX HEXACHLOROBUTADIENE*
DIEL	DIELDRIN	X1HCBD X2HCE	HEXACHLOROETHANE
PIENDA	ELDRIN ALDEHYDE	XZHCE	
PIHEPE PIMIRX	HEPTACHLOREPOXID MIREX		
PIOCHL	OXYCHLORDANE		
PIPCBT	PCB, TOTAL		
1PMIR	MIREX PHOTO		
PIPPDD PIPPDE	PP-DDE		1
ISTRO	STROBANE*		
YOX	TOXAPHENE		
(2HCB	HEXACHLOROBENZENE		
	VOLATILES		
HOCTE	1-OCTENE	X1ACRO	ACROLEIN ACRYLONITRILE*
BIVBR	VENYL BROMIDE.	X1ACRY	ACKIEOMIKEE
32BDCL	BROMODICHLOROBENZENE	1	1
EZEBNZ EZMPXY	ETHYLBENZENE M-, AND P-XYLENES		1
320XYL	O-XYLENE		1
32STYR	STYRENE	1	1
IDIEE	DIETHYL ETHER		i
.1HEX M2CEE	HEXANOL 2-CHLOROETHYLVINYLETHER*		
(1111T	1,1,1-TRICHLOROETHANE		i
(11122	1,1,2,2-TETRACHLOROETHANE*	i	1
(111 2T (111 C E	1,1,2 TRICHLOROETHANE®	1	1
CIIICE CII2CE	1,1-DICHLOROETHANE 1,2-DICHLOROETHANE		1
(112CP	1,2-DICHLOROPROPANE	i	
(113DP	CIS-1,3-DICHLOROPROPENE		i
(113DR (1ACTO	TRANS-1,3-DICHLOROPROPENE ALPHA-CHLOROTOLUENE	1	1
(IBDCM	BROMODICHLOROMETHANE	ı	i
(1BETH	BROMOETHANE*		9
(1BROM	BROMOPORM*		!
(1CDBM	CHLORODIBROMOMETHANE		
(1CDCE (1CHLE	CIS-1,2-DICHLOROETHYLENE CHLOROETHANE*		
CICHLM	CHLOROMETHANE*	į.	i
CICHLO	CHLOROFORM		1
CICTET CIDCEM	CARBON TETRACHLORIDE DICHLORODIFLUOROMETHANE	1	1
CIDCEM	1.1-DICHLOROETHENE		
KIT12D	TRI-1,2-DICHLOROETHYLENE*		
CITCEM	TRICHLOROFLUOROMETHANE*		
OTETR OTRIC	TETRACHLOROETHYLENE TRICHLOROETHYLENE	1	
CIVCL	VNYL CHLORIDE*		
(212CB	1,2-DICHLOROBENZENE		
(213CB	1,3-DICHLOROBENZENE	1	1
(214CB (23CTO	1,4-DICHLOROBENZENE 3-CHLOROTOLUENE	1	1
C2CBEN	CHLOROBENZENE		
(2CPPE	3-CHLOROPROPENE*		
	l		

COMPANTIONAL. COMPANTIONAL CONTRIBUTIONAL CONTRIBUT					, ner	TESTED	DET.	DET.	PLANTS	PREV.	GEO. MEAN	SPREAD	MAX. CONC.	MIN. CONC.	LIMIT (DL)
BOD SDAY-TOTAL DRAWND	CONVENT	IONAL													
ALIMANIAN MATTER CATALON WALL WITH WALL OF A COMMINIAN TOTAL WALL WALL WALL WALL WALL WALL WALL W	3000		•		:	:	:								
DISSIGNATE CARRIONS WITH TRACE CARRIONS WITH TRACE AND T	8003	CHEMICAL OXYGEN DEMAND	A C	0 0	9 9	0 9	0.00	7 7	7	0 001	25.95	991	48.20	14.40	87
NITMATESTOTAL BETACLE. MICHATESTOTAL MICHATESTOTAL. MICHATESTOTAL MICHATESTOTAL MICHATESTOTAL MICHATESTOTAL MICH	500	DISSOLVED ORGANIC CARRON	no V		2 2	2 5	0.00	4 (7 (0.001	8 8	4	110.00	9.5	000
NITRATES TOTAL HIT REAC	NNO2FR	NURTH FOLT REACT	1		2 5	2 5	9	4 (, ,	0.001	60.0	4	8 5	830	8
AMONINALIZATION. AND CYANIDE. AND CYANIDE.	NNOTER	NITRATES TOTAL FILT REAC	L'ou		2 9	2 5	0.001	4 (4 (000	7 7 7	17.6	707	110	0.0
ALIMENTALITY ALIM	MATKIE	NITROGEN-TOTEKHAL HAW TOT	1		2 5	2 2	9 9	4 (٦ ,	000	20.00	9 :	0.13	0.40	000
Prioriside State Priority P	4	CI OCHIACONINI			2 5	2.5	900	4 (7 (100.0	10.83	2 :	45.00	8.30	10.0
HESDINE, PARTICULARY AND MACHINE AND MAC	L XX	BAOCHIONIS INTELLEGIAL			2 \	2 '	0.001	7 .	7	0.001	7.92	1.03	8.38	7.57	90.
	950	BESIDIE BABTICE ATT			• •		0.001	٠.	(0.00	970	81.1	0.31	0 20	10.0
AMMONINTY TOTAL FITTHAC. mgL 0 5 5 1000 1 1 1 1000 4098 104 422 9 98 0 AMMONINTY TOTAL FITTHAC. mgL 0 5 10 600 1 2 5 5 1000 600 2 5 5 100 0 600 1 2 6 0 1 2 6 0 6 0 1 2 6 0 6 0 1 2 6	RSF Octa	RESIDUE, PARTICULATE	E C	۰ د	0 '	01	0.001	7	7	0.00	29.12	1.50	51.40	17.30	00.1
AND CYANIDE AND C	KSHO	RESIDUE, PART, USS ON ION.	mg/	0	7	7	100.0	-		0001	40 98	3	42.20	39.80	0.00
AMMONIMITOTAL FITTHEAC. mg/L 0 0 110 000 1 2 1000 000 1280 633 065 HIBNOLICS (AAAP) AND CYANIDE ALI IMPRINAL TOTAL. mg/L 0 12 110 000 1 2 2 000 000 113 000 010 010 010 010 010 010	TURB	TURRIDATY	mg/L	0	'n	S	100.0	-	-	100.0	25.76	1.20	30 00	19 40	0.25
ALIMENDIAGE (AAAP) mg/L 0 2 10 20 1 2 50 0 0 1 1 1 0 1 0 1 0 1 0 1 0 1 0 0	MAITH	AMMONIUM TOTAL FILT REAC.	meA	0	•	10	0.09	2	2	0001	090	12.60	4.16	940	02.0
ALINGUIALINGITATOTAL.	PHYOL	PIBENOLICS (4AAP)	me.J.	0	2	9	000		, ,	9	8 6	084	250	0.00	9 9
ALIDIMINAL STATES AND CYANIDE ALIDIMINAL STATES AND STATES AND STATES AND CYANIDE ALIDIMINAL STATES AND STAT												:		3	2.0
ALJMININALINHILTTOTAL. 44, 0 12 110 100 2 2 1000 171,20 1131 24000 10000 10000 10000 10000 10000 10000 10000 10000 10000 1000 100000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 100000 10000 10000 10000 100000 100000 10000 100000 10000 10000 10000 100000 10000 10000 10000 10000	METALS A	IND CYANIDE													
MACHINELINGHIALLOYAL. WALTON CONTINUELLY OF THE CO															
###CHANGHALLANDAL WALL ON THE PROOF TO THOSE STATE OF THE PROOF TO THE PROOF	177	ALUMINUM, UNITET TOTAL	ځ.	0 (12	12	1000	7	2	0.001	171.20	1.31	240 00	100 00	20.00
STATION FOR PARTICULAR 12 12 100 2 100 200 136 350 1600 1500 1		MERCUR LUNITILIOIAL	ug/L	0	0	01	1000	7	2	0.001	001	22.	0.02	0.0	0.01
COPPER, LINIAL TOTAL. SECRETARIAL TOTAL TOTAL. SECRETARIAL TOTAL	SKO!	STRONTIOM, UNFILL TOTAL	νg,	0	12	15	1000	2	2	100 0	230.70	1 36	330.00	160.00	10.00
COMPRENENT TOTAL. 99,1 0 1 1 2 500 1 1 2 500 1 1 0 0 000 1000 1	TON:	ZINC, UNHILL TOTAL	, Z	0	=	12	7.16	7	2	100.0	11.90	1 37	20 00	10.00	20.00
COMMINALIZATIONAL WAY 0 3 112 250 2 1 1000 150 150 150 150 150 150 150 150	202	COPPER,UNI-ILT.TOTAL.	ugA,	0	-	7	200	-	2	9	10.00	8	0001	8	9
COMATUNITITOTAL with with the control of the contro	700	CADMIUM,UNFILT.TOTAL	ue/L	0	3	12	25.0	2	,	0001	08.	1 40	8	200	200
MOCKBOENIM CHELT TOTAL	2007	CORALTUNEIL TOTAL	L'en	0		13	25.0	,		000	9 30		2	8 9	300
NICKEL JINENTITOTAL	MOUT	MOLYBOP NI M UNFIT T TOTAL	Von			2	2			000	000	141	3 2	0001	1000
CIRCOMILINALISMENT TOTAL. upt. 0 2 12 15 15 1 2 100 1000 1000 1000 100	127	NICKE LINE TAGE	2		۰.	7 :	3 %	۰, ۱	7 (0001	2.90	1.3/	00:01	10.00	10 00
24-DICHLOROPHENOXYACETICACID ug/L 3 7 10 700 2 2 1000 003 208 1137 1000 1000 1000 1051 1052 1052 1052 1052	LIA.	CHROMBINA INVESTIGATION	3		۰.	7 :	9 :	7 .	7	0.001	069	1.74	30 00	10.00	10.00
DES. JUR BRICIDES, PCTAS 2.4 FIGURE, OROPHIROXYAGETIC ACID 2.4 FIGURE, OROPHIROXYAGETIC ACID 1.2 FIRCH OROPHIROXYAGETIC ACID 1.2 FIRCH OROPHIROXYAGETIC 1.4 FIGURE, OROPHIROXYAGETIC 1.4 FIGURE, OROPHIROXYAGETIC 1.5 FIRCH OROPHIROXYAGETIC 1.6 FIRCH OROPHIROXYAGETIC 1.6 FIRCH OROPHIROXYAGETIC 1.7 FIRCH OROPHIROXYAGETIC 1.8 FIRCH OROPHIROXYAGETIC 1.8 FIRCH OROPHIROXYAGETIC 1.9 FIRCH OROPHIROXYAGETIC 1.1 FIRCH OROPHIROXYAGETIC 1.2 FIRCH OROPHIROXYAGETIC 1.3 FIRCH OROPHIROXYAGETIC 1.4 FIRCH OROPHIROXYAGETIC 1.4 FIRCH OROPHIROXYAGETIC 1.5 FIRCH		The second of th	, a	•	7	71	Q.	-	7	20.0	2.90	1 37	000	10.00	10 00
24-DICILI ONOPHI: NOXYACETIC ACID	PESTICIDE	S,HERBICIDES,PCBS													
ACTION ACCOMPANIANCE TICACID 16/1. 3 7 10 700 2 2 1000 603 258 010 603 248 110 603 MITHON CORPORTING 12/4-TRICHIGNOBENZINE 16/1. 4 10 240 11 2 500 001 211 004 602 GAMACA BIICHIGNACHION CINCACLIBEANNISH, 1 10 100 11 2 500 001 112 001 001 ENONSITY NA SHIPMANISH 16/1. 1 10 100 11 2 500 001 12 001 101 101 101 101 101 101 10															
HITHOAYGE BORN 1947, 1 4 10 400 11 2 500 007 377 070 010 124-THICH CHERKETIC MEDICAL 1947, 1 1 10 100 1 2 500 001 211 004 002 ENONSHIP MEDICAL SAND 1947, 2 1 10 100 1 2 500 001 125 001 001 ENONSHIP MEDICAL SAND 1947, 2 1 10 100 1 2 500 001 125 001 001 HEYACHO ROPOVI CHERKET AND 1947, 2 1 1 10 100 1 2 500 001 129 013 HEYACHO ROPOVI CHERKET AND 1947, 2 1 1 10 100 1 2 500 001 125 001 001	P324D	24-DICHLOROPHENOXYACETIC ACID	υgΛ.	3	7	10	70 0	2	2	100 0	0.03	2.08	010	0.03	0.02
1,24.4 KRUZHOKRIVINE ug/l. 2 10 200 1 2 500 001 211 004 002 1,24.4 KRUZHOKRIVINE ug/l. 2 1 10 100 1 2 500 001 211 004 002 ENOOSUIJAN SULPHATE ug/l. 3 1 10 100 1 2 500 001 125 001 001 HEYACHO ROOT ROUTH URL ug/l. 3 1 10 100 1 2 500 001 125 001 HEYACHO ROUTH ROUTH URL ug/l. 3 1 10 100 1 2 500 001 125 001 001	PIDMIJI	METHOXYCIBOR	Ŋ,	_	4	10	40.0	-	2	90.0	0 0 0	3.77	0.70	010	0 0 0
COMMAN HICHTRACHI DRCYCLIEXAND, apr. 1 1 10 100 1 2 800 0.01 153 0.01 0.01 ENDOSIDIA MS INTRACTIONAL AND	X2124	1,2,4 TRICHLOROBENZENE	Lgu L	•	7	10	200	-	2	20.0	100	211	200	000	100
ENODSULPAN SULPHATE ugh. 3 10 100 1 2 500 002 189 015 015 114 114 114 115 116 117	PIBHCO	GAMMA-BIIC(III:XACIII.ORCYCI.JIEXAN	E) ug/L	7	-	10	10 0	-	2	005	100	1 25	100	100	5 6
10 10 10 10 10 10 10 10 10 10 10 10 10 1	PIENDS	ENDOSULIAN SULPHATE	ug/J.	٩	-	10	100	_	,	Ş	000	1 9	100		000
102 ACM ORDOWNY ORBINATA AND 100 100 1 2 500 001 1.25 0.01 0.01	PHREPT	HE-PTACIR OR		, -		2 2			7 (0.00	700	68	013	0.13	000
	CHICCE	16XACIA OBOCVCI OBINTADIENE		٠.		2 5	0.01		7	000	100	1.23	0.01	10.0	0.01

	CONFIRMED		NOT CONFIRMED
CONTA MINANT CODE	CONTAMINANT NAME	CONTAMBNANT CODE	CONTAMINANT NAME
	METALS AND CYANIDE		
BEUT	BERYLLIUM, UNFILT. TOTAL		
	BASE NEUTRAL & ACID EXTRACTABLE COMPOUNDS		
P2AMET P2ATRA	AMETRYNE ATRAZINE*	PMPCRE	P-CRESOL*
P4DIAZ	DIAZINON*		
P4EPAR	PARATHION ETHYL*	1	ļ.
P4MALA	MALATHION*	Į.	
P4MPAR PM24MP	METHYLPARATHION*	[
PM24NP	2.4-DIMETHYLPHENOL 2.4-DINTIROPHENOL		
PM4BPE	4-BROMOPHENYLPHENYLETHER		
PM4CPE	4-CHILOROPHENYLPHENYLETHER		
PMANAA	ALPHA-NAPHTHYLAMINE*		
PMB2IE PMBNAA	BIS(2-CHLOROISOPROPYL)ETHER BETA-NAPHTHYLAMINE		
PMDPE	DIPHENYL ETHER		
PMNND	N-NTROSO-DI-PHENYLAMINE		
PN2CNA	CHLORONAPHTHALENE*		
PNACNE	ACENAPHTHENE*		1
PNACNY PNANTH	ACENAPHTHYLENE ANTHRACENE		
PNBAP	BENZO(A)PYRENE		
PNBBFA	BENZO(B)FLUORANTHENE		
PNBIPH	BPHENYL		
PNCHRY	CHRYSENE		
PNDAHA PNFLAN	DIBENZO(A,H)ANTHRACENE* FLUORANTHENE		
PNFLUO	FLUORENE		
PNGHIP	BENZO(G,H,I)PERYLENE*		
PNINP	DENO(1,2,3-CD)PYRENE *		
PODICH POTOC	DICHLORAN*		
X3245	TRI-O-CRESYL PHOSPHATE* 2,4,5-TRICHLOROPHENOL*		
	DIOXINS AND FURANS		
P94CDD	TETRACHLORODIBENZODIOXIN*		1
P95CDD	PENTACHLORODIBENZODIOXIN		
P95CDF P96CDD	PENTACHLORODIBENZOFURAN HEXACHLORODIBENZODIOXIN		l e
P96CDF	HEXACHLORODIBENZODIOXIN HEXACHLORODIBENZOFURAN		
P97CDF	HEPTACHLORODIBENZOPURAN	:	
	PESTICIDES, HERBICIDES, PCBS		
POPCNB	PCNB	POCAPN	CAPTAN*
P1ALDR	ALDRIN	X1HCBD	HEXACHLOROBUTADIENE*
PLBHCD PLENDA	DELTA-BHCHEXCHLORCYCLHEXANE) ELDRIN ALDEHYDE		
PIHEPE	HEPTACHLOREPOXIDE		1
Plochil,	OXYCHLORDANE		
P1PMIR P1STRO	MIREX PHOTO STROBANE*		
X2HCB	HEXACHLOROBENZENE		
	VOLATILES		
BIOCTE	1-OCTENE	X1ACRO	ACROLEN
BIVBR	VINYL BROMIDE*	XIACRY	ACRYLONTIRILE*
EIDIEE	DIETHYL ETHER		
L1HEX PM2CEE	HEXANOL		
X11122	2-CHLOROETHYLVINYLETHER* 1,1,2,2-TETRACHLOROETHANE*		
X1112T	1,1,2-TRICHLOROETHANE®		
X112CP	1,2-DICHLOROPROPANE		1
K113DP	CIS-1,3-DICHLOROPROPENE		1
KI BETH KI BROM	BROMOETHANE* BROMOFORM*		
XICHLE	CHLOROETHANE*		
X1CHLM	CHLOROMETHANE*		
XICTET	CARBON TETRACHILORIDE		
X1T12D X1TCFM	TRI-1,2-DICHLOROETHYLENE* TRICHLOROFLU'OROMETHANE*		
XIVCL	VINYL CHLORIDE*		1
K212CB	1,2-DICHLOROBENZENE		1
X213CB	1,3-DICHLOROBENZENE		
K214CB K23CTO	1,4 DICHLOROBENZENE 3-CHLOROTOLUENE		
	3-CHLOROPROPENE*		I

^{* -} NOT DETECTED IN ANY STREAM TYPE AT ANY PLANT

DOC. INSIGNACY DIGESCRECAMENTO. DOC. MISSION CONTROLLAR. STRICKE STRICKEST PREALED FOT COLLEGE STRICKES STRIC	CONTAM	CONTAMINANT NAME	UNITS QA/QC GLOBAL CODE # SAMPS. DET.	C GLOBAL E # SAMPS. DET.	GLOBAL # SAMPS. TESTED	GLOBAL % FREQ. DET.	GLOBAL # PLANTS DET.	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GLOBAL GEO. MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONC.	GLOBAL MIN. CONC.	DET. LIMIT (DL)
NINGOS NINGON CANCANCA MONTO TABLE TO T	CONVENTI	IONAL												
The Colonial Control Line Colonial	506	The state of the s				:								
TURBINITY ONLY SERVICE AND SER	NNTKUR	DISSOLVED ORGANIC CARBON NITROGEN-TOT KIEL, UNP. TOT		222	222	100.0	5 %	8 8	100.0	8.09 7.97	1.60 271	32.10	2.70	000
REGISTRE PAPERTAKENE WELF, 12 21 21 21 21 21 21 21 21 21 21 21 21	- E	(-LOG(II+(CONCN))		224	224	100.0	87 25	82	100.0	7 10	1.05	8 18	6.38	00.1
BOD STAN - STAND - BOD STAND - STAND	RSP	RESIDUE, PARTICULATE	_	219	250	9 66	7 8	7 8	1000	10.12	2.00	200 00	046	22.0
WASHINGTON, WASH	80D\$	BOD, S DAY - TOTAL DEMAND		211	213	1.66	58	82	100.0	21 22	2.07	110.00	3.50	1.00
AND CYANIDE STRONTING INTEGERS (AAA) NINCHED INTEGERS (AAAA) NINCHED INTEGERS (AAAA) NINCHED INTEGERS (AAAA) NINCHED INTEGERS (AAAAA) NINCHED INTEGERS (AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	PRI	CHEMICAL OX TGEN DEMAND PHOSINORUS UNFILT TOTAL		200	213	2.8	8 7	8 7	000	52.80	183	226 00	12.00	5.00
NINTERFECT NAME (1947) NINTER	NATTER	AMMONIUM, TOTAL, PILT REAC.	_	707	223	91.5	\$ 25	3 23	100.0	3.90	6.98	27.70	0.00	0.01
AND CYANIDE STRONTIUM INFELT TOTAL WALL AND ACID EXTRACTABLE COMPOUNDS MECHANICINET TOTAL WALL AND ACID EXTRACTABLE COMPOUNDS WEST OFFICE WHITH TOTAL WALL AND ACID EXTRACTABLE COMPOUNDS WEST OFFICE WHITH WAS ACID EXTRACTABLE WHITH WALL IN TOTAL WALL AND ACID EXTRACTABLE WHITH WALL IN TOTAL WALL IN THE WALL IN TOTAL WHITH WALL IN THE WALL IN TOTAL WALL IN THE WALL IN TOTAL WALL IN THE WALL IN TOTAL WHITH WALL IN THE WALL IN TOTAL WALL IN THE	S-ELONN G-ELONN	NITRITE FILT REACT.		194	220	88.2	72	82 5	96.4	0 22	\$ 95	330	003	0 0 0
NECKOLICS (AAA)	RSPLOI	RESIDUE PARTOSS ON IGNI		2 %	224	830	27	£ 2	95. 59 49. 69	233	1.75	28 40	0.25	0.05
AND CYANIDE: SINCHMARITATIONAL WALL OF 262 267 1870 238 238 1000 344/90 214 4500 100 SINCHMARITATIONAL WALL OF 262 267 267 267 267 267 267 267 267 267	PIENOL	PHENOLICS (4AAP)		33	225	14.7	2	78	53.6	0.00	186	0.68	0.10	0.10
STRONTION. STRONT														
STRONTHUM, INFELT TOTAL. 10, 10, 20, 25, 25, 26, 27, 28, 100, 28, 28, 100, 34, 99, 214, 450000 MECRIC RAYLEST TOTAL. 10, 10, 10, 220, 23, 34, 42, 28, 28, 100, 0, 013, 22, 20, 30, 30, 30, 30, 30, 30, 30, 30, 30, 3	METALS A	ND CYANIDE												
ALTONITION MINERLITOTAL Way, 0 224 225 244 235 245 246 2														
MERCIRA/USERTITONAL UPL 0.220 233 544 252 550 1000 051 243 1000 051 051 051 051 051 051 051 051 05	SRUT	STRONTIUM, UNFILT, FOTAL, ZINC LINEL F TOFAL	0 To 1.	267	197	100.0	28	87 %	100.0	340 90	2.14	4500 00	80.00	10.00
MCMANINALITYONAL. 1946. 1946 1946 1946 1947 1947 1947 1948 1948 1948 1948 1948 1948 1948 1948	HGUT	MERCURY, UNFILT TOTAL		220	23	z z	ទ ភ	ទ ន	1000	003	2.62	0.00.00	00.00	0000
CROMINGNETT TOTAL CROMINGNETT T	ALUT Narr	ALUMINUM, UNPILT TOTAL.		196	564	74.2	27	78	96 4	101.70	372	\$KOO 00	40.00	20.00
COMMINICATE TOTAL	CCC	COMPER, UNFILL TOTAL		30	7 74	2 &	2 2	3 5	85.7	2 2 2	360	00000	000	00 01
CANDRIAN, PRINCIPALITY May 1	CRUT	CHROMRJM,UNI: ELTTOTAL.		137	267	51.3	22	: 23	89.3	006	200	140.00	10.00	10.00
CAMMINIUMENT TOTAL. CAMMINIUMENT TOTAL. CAMMINIUMENT TOTAL. CAMMINIUMENT TOTAL. CAMMINIUMENT TOTAL. CAMMINIUMENT TOTAL. ULL 0 22 20 21 2 2 2 2 2 2 2 2 2 2 2 2 2 2	COLT	CORAL FUNDIL TOTAL		2.3	197	2 2	6 5	28	67.9	099	1.56	20 00	10.00	10 00
TUTAAL AND ACID EXTRACTABLE COMPOUNDS TOTATION FROMER LOWARD TOTAL UMAL OF \$1 20 20 20 20 20 20 148 0 100 0 148	CDUT	CADMIUM,UNPU,T TOTAL.		8	797	24.3	50	1 23	71.4	210	207	2 2	388	3.00
SHEARIMALTTOTAL u	PBUT	LEAD, UNRILT TOTAL		7 57	777	9 4 9	13	8 8	4.6	1.30	368	6 43	8 8	1.00
VERTING VERT	AGUT	Sa.ver,UNFQ.T.TOTAL		1.5	267	8.6	S	87	32.1	06.0	18.	1250 00	10.00	00 01
MCRISOL	SEUT	SELENIUM, UNINIT. TOTAL.		m m	252	1.2		8 8	36	16.70	1 67	00.00	00.00	90 90
UTRALAND ACID EXTRACTABLE COMPOUNDS M CRISOL. u.g.l. 1 7 227 31 4 28 14.3 170 170 90.50 PHENOL. u.g.l. 2 4 227 18 3 28 16.3 170						:		i	2		69 •	90.00	00.00	8
MCRISOL. Ug/L 7 227 31 4 28 143 170 170 93.0 PHENOL. Ug/L 4 227 18 3 28 107 116 173 173 NTROBENOL. Ug/L 4 228 13 2 2 71 119 134 173 PHYLOGO. Ug/L 1 2 2 2 71 2 13 2 17 199 134 17 199 13 2 17 1 1 2 17 1 1 1 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 1 2 1 2 1 1 1 2 1 1	BASE NEUT	TRAL AND ACID EXTRACTABLE COM	POUNDS											
MHENOLI,	PMMCRE	M CRESOL	ugA. 1	7	227	3.1	•	82	14.3	1.70	1.70	30.50	4 30	8
NITROBENZATION Web. 1	PMINTEN	MIENOL	ugA. 2	4	227	1 8	3	78	10.7	1.65	1.59	17.30	7.50	300
PARTICIDATION PARTICIDATION PARTICIPATION PARTICIPATIO	PMNIIB	NITROBENZENE BITTYI BENZYI BETTARI ATDI		4,	228	æ :	4	28	14 3	1.09	1.54	5.70	4 50	2.00
24-DIGHOROM VERSOL. UST. 1 2 227 0.0 2 20 21 1 2.0 34.00 24-DIGHOROM VERSOL. UST. 1 2.0 34.00 34.00 24-DIGHOROM VERSOL. UST. 1 2.0 34.00 3	ХЗРСРП	PENTACH OROPIG:NOI.	1001	۰.	877	5.1	7 (25 25	7.1	1.09	1.59	25 00	3 80	2 00
24-DIGHUMORPHEADL. ug/l. 1 1 227 0.4 1 23 56 28 152 28 80 24-DIGHUMORPHEADL. ug/l. 1 1 227 0.4 1 23 56 28 152 28 80 24-DIGHUMORPHEADL. ug/l. 1 228 0.4 1 23 36 16 16 153 23 90 25 0.4 1 23 36 16 16 153 23 90 25 0.4 1 23 36 16 16 153 23 90 25 0.4 1 23 26 16 1 153 23 90 25 0.4 1 24 12 12 12 12 12 12 12 12 12 12 12 12 12	PMPCMC	P-CHI.ORO-M-CRI.SOI,	ug/L 1	. 7	227	60	۰ ۲۷	8 25	7.1	268	8 5	38.70	680	8 8
4-DIMINOTOLUZISE UgA. 1 1 228 04 1 28 36 161 153 259 04 1 28 36 161 153 259 04 1 28 36 161 153 259 05 05 05 05 05 05 05 05 05 05 05 05 05	PM24DP	24-DICHLOROPHENOL	ug/L 1	-	227	9:0	-	28	3.6	2.68	1 52	28 80	28 80	8 8
2. WITHOUSE WITHOUS WITHOUS WITH 1 227 0.0 1 2 3 5 16 2.0 15 15 2.0 15 2	PMZ6DT	24-DINITROTOLDENE	1.8/L		228	9.4		82 58	3.6	191	1.53	23 90	23 90	3.00
AMERITA POPULING PRINTED PHENOL. UP. 2 1 227 04 1 28 36 270 150 150 150 150 150 150 150 150 150 15	PM2NP	2.NITROPHI.NOI.	ug/L		877	4.0		8 8	36	191	1.53	26 80	26 80	3 00
HS.Q.CAUARITHANE ugh. 1 228 04 1 28 36 267 150 258 04 1 28 36 267 150 259 050 050 050 050 050 050 050 050 050 0	PM46DP	2 METHYLA DINFIROPHENOL		-	227	0.4		3 23	3.6	2.70	1 22	143.70	143.70	900
HIS CORROWED THE TABLE WITH 2.25 04 1 25 36 108 155 128 05 108 155 128 05 108 155 128 05 108 155 128 05 108 155 128 05 108 155 128 05 108 155 128 155 128 155 128 155 128 155 128 155 155 155 155 155 155 155 155 155 15	DAGOSCA	4-NITROPHENOL		_	227	0.4	7	28	3.6	2.67	1.50	20.80	20.80	200
DIMETRIAL PRITINAL ATT. WELL 1 228 04 1 29 36 101 134 500 0 O CRESOL HOUST WELL 1 228 04 1 29 36 109 138 430 0 O CRESOL WELL 1 228 04 1 29 36 109 138 430 0 BENZIXANANTIRACENI WELL 1 228 04 1 28 36 108 159 29 0	PMB2NE	BIS (2 OFFORMED IN EDITION EDI			228	0 0		87 87	3.6	1 08	1.56	32.80	32.80	2.00
NITROSOD-INFOPYLAMINE wg7, 1 1 228 0,4 1 28 16 108 158 4.500 O CRESON wg7, 2 1 228 0,4 1 28 16 100 149 7.50 BENZOANTHRACENE wg7, 1 1 228 0,4 1 28 3,6 108 159 750	PMDMP	DIMITHYI, PIGITIALATI:	u.A.		22M	2 0		28	36	101	¥ :	30.60	30 60	3.00
U.CHISMI. U.gh. 2 1 227 04 1 28 36 160 149 7.50 BENZIXANANTHRACENE U.gh. 1 1 228 04 1 28 36 108 136 2940	PMNNP	N-NTIROSO-DI-NPROPYLAMINE	ugh.	-	228	0.4		1 %	36	108	1 58	43 60	43.60	2 00
DEMOMFRACENH UGAT. 1 1 228 04 1 28 36 108 156 2940	PMOCKE	O'CRESOL.	ug/l, 2	-	227	0 4	1	28	3.6	1 60	1.49	7.50	7.50	3 8
	Sugar.	DENZAAAMMINAACEMB	ug/1.	-	228	0.4	-	87	3.6	80 ~	1.56	29 40	29 40	2 00

TABLE 5-10 b - GLOBAL SUMMARY OF CONTAMINANTS IN SECONDARY EFFLUENTS

228 0.4 1 28 3.6 1.07 15.3 14.60 14.60 228 0.4 1 28 3.6 1.07 15.3 14.60 14.60 228 0.4 1 28 3.6 1.07 15.3 17.60 17.60 228 0.4 1 28 3.6 1.07 15.3 17.60 17.60 228 0.4 1 28 3.6 1.07 15.3 17.60 <t< th=""><th>NANT.</th><th>CONTAMINANT NAME</th><th></th><th>CODE</th><th>SAMPS.</th><th>* SAMPS</th><th>S FREQ.</th><th># PLANTS</th><th>P A NTS</th><th>% PLANT</th><th>GEO.</th><th>SPREAD</th><th>MAX.</th><th>MIN.</th><th>DET.</th></t<>	NANT.	CONTAMINANT NAME		CODE	SAMPS.	* SAMPS	S FREQ.	# PLANTS	P A NTS	% PLANT	GEO.	SPREAD	MAX.	MIN.	DET.
TRAILAND ACTURENTS TO ACTURE STREET OF THE S					-			:	2					> DIT	(DI.)
Particular Par	ASENEU	TRAL AND ACID EXTRACTABLE COMP	SUNDS												
ANATOLIA SISTEMATOR SIGNATOR S	BKP	BENZOKAPLUORANTIUNE	υκΛ.	-	-	328	0	-	38	36	1 03	1.53	14 60	14 60	2 00
NADETIANS AND FLANCE GROUPS STATE OF THE ACTION OF THE AC	INAN	NAPITITAL FNE	Ž	-	-	228	• 0	-	87	36	1.06	1 48	240	240	2 00
PRESENT STATEMENT NOT THE STAT	NEW	PHENANTHRENB	ug/J.	-	-	228	† 0	-	78	36	100	1 53	17 80	17 80	200
AND FLIANS AND FL	PYR.	PYRENE	ug/L	-	_	228	• 0	_	28	30	1 61	7	N 40	29 40	38
AND PLANS CHACATOR GROUPS AND	3246	2-QB_OROPHENOL 2,4,6-TRICHLOROPHENOL	ž.	0 -		727 722	0 0		87.87	36	700 700 700	4 4	9 20	9 20	8 8
TENGENDES/ANTHANN TOTAL ORGANISACIONALY TENGENDES/ANTHANN TOTAL ORGANISACIONALY TOTAL O															
CCTAGLI CHORDINE NOTATION Val. 4	OXINS	INDFUKANS													
The management of the manage	SCDD	OCTACH ORODIBENZODIOXIN	Ž,	_	4	3	9 1	•	87	14 3	031	3.43	11 00	010	0.30
TETRACTILOROPHISTOTIVINAN 197. 1 4 4 20 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 2 2 1 2 2 1 2 2 1 2	7CDD	HEPTACHI ORODIBENZODIOXIN	Ž,		7	4:	9 :	7 (8 2	7.1	0 38	374	4 30	140	010
15. HERBICIDEA, PCBS. 2. GOTOUR OPPORTES, CANADA UNITED TO THE TOTAL OPPORTER OF THE TOTAL OPPORTER OPPORTER OF THE TOTAL OPPORTER OF THE TOTAL OPPORTER OPPO	400 t	OCTACH ORODIBENZOPURAN TETRACHLORODIBENZOPURAN	33	7	7 -1	3 3	73	7 -	5 5	3.6	0.28	3 90	033	030	010
2.4 DIGG GOOD WOON TRANS VACUITY AND 1.07 227 78 0 28 1000 0008 471 540 000 000 000 000 000 000 000 000 000	STICIDI	ES,HERBICIDES,PCBS													
1.3 THICLU ROUGHEN TO THE TANKEN, and 1 157 227 110 11 2 2 3 42 9 00 00 00 00 00 00 00 00 00 00 00 00 0	24D	24 DIGIL OROPHENOXYACTETIC ACID	, n		111	227	78.0	87	58	100.0	0.08	471	X 8	0 0 0	0.02
243-TRICLIA MONTHING LINE AND LANGES AND LAN	9110	OAMMA-RECTERACTE ORCYCLIE XAN		۰ ,	157	227	35	27	8 7.	8	005	248	0.19	000	0 01
SIN NY. SIN	2456	1.24 TRICHI DROBENZENE 24 S.TRICL ORBSTENOXXACCTIC ACID	5		2 ×	177	2 -	, <u>;</u>	8 %	32.1	100	2 2 2	0.30	700	000
FET A RECORDINACY CLUBANANE)	VII.S	SH.VEX	2	-	3 2	227	0.01	: =	3 %	675	000	1 83	2.40	500	0.00
PR STOCK AND STO	BFICE	BETA BHC (REXCRUORCYCLARXANE)	2	-	•	227	0 7	۰	1 27	214	001	1 38	000	100	0.01
APPLICATION CONTINUES	PCHT	PCB, TOTAL.	Ž,	7 .	σ,	227	0 7	æ ·	87.	280	0.05	1 40	0.19	00	0
APPLICATIONISME. APPLICATIONI	E P	ALISHA BILCHEVOTI OBCYCLERYANE			. •	177	1 (n =	3 2	6 7 7	100	87.	3 6	100	100
HEACH CHOICHANNEN, Ug/L 3 227 22 4 28 143 001 130 009 001	٥١١٧	ALPHA CHEORDANE		. –	, ~	227	7.7	-	1 7	143	000	13.1	800	100	100
HEXACII CARRETINATE up. 3 3 227 2 2 2 2 143 001 113 003 001 112 002 112 002 112 002 112 003 001 112 003 001 112 003 001 112 003 001 112 003 001 112 003 001 112 003 001 112 003 001 112 003 013 001 112 003 013 001 112 003 013 001 112 003 013 001 112 003 013 001 112 003 013 003 013 003 013 003 013 003 013 003 013 003 013 003 013 003 013 003 013 003 013 01	CHEO	GAMMA CHLORDANE	Na.	_	s	227	2.2	4	28	14 3	10.0	1 36	900	0 0 2	0.0
TOXAGLIANN SULFACE W.M. 5 3 227 13 2 25 71 002 122 017 006 000 000 000 000 000 000 000 000 00	EHCE:	IEXACIU ORDETHIANE	Ž	~	~	227	2.2	4	238	14 3	0.01	1.23	0.05	100	100
DELIMINE U.M. 1 2 2 227 1 2 2 7 1 002 113 004 004 004 004 004 004 004 004 004 00	FNDS	ENDOSULPAN SULPHARE	Ž,	~ (۰,	227	<u>e</u> :	7 -	7 3	7.1	005	1 22	0.17	900	000
ENDSKII PANII UNIT TO THE PRODUCT OF	Y E	DIFLORIN	3	۰ د	• ~	177		7 -	8 2	3.6	700		000	3 6	0.0
HEPTACHLORM LINE TACGLORM LINE TAC	FND2	ENDOSUI PAN II	5	. ~	2	227	60		35		100	2 2	100	000	100
PUDDIA ULA STATE OF THE STATE O	HEPT	HEPTACHLOR	, J		5	227	60	. 7	28	7.1	100	9	0.02	0.02	100
HYDDI HYDI HY	HADD	OCC PP-DDD		-	2	227	60	7	87	7.1	0.01	1 10	0.01	0.01	0 0 1
ENDOSHIPANI UGH. 3 1 227 04 1 28 36 001 112 002 002 002 MHRX MRRX UGH. 3 1 227 04 1 28 36 001 114 003 003 003 MHRX UGH. 3 1 227 04 1 28 36 001 119 003 003 003 UGH. 3 1 227 04 1 28 36 001 108 001 001 001 UGH. 4 1 28 36 001 108 001 001 001 UGH. 4 1 28 36 001 108 001 001 001 UGH. 4 1 28 36 001 108 001 001 001 UGH. 4 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	FOT	PP: DDT	Ž,	9	2	227	60	7	8 7	7.1	0.02	1 14	000	900	000
MERCAN MERCAN WALL 1 1 227 04 1 28 36 001 114 003 003 112 112 112 112 112 112 112 112 112 11	ENDI	ENDOSULPANT	3	۰,	_	227	0.4	-	28	3.6	0.01	1 12	0 0 0	0 0 2	100
HEACHLOROCYCLOPISKIADHUNE wg/l 3 1 227 04 1 28 36 001 108 001 001 108 001 109 109 109 109 109 109 109 109 109	N CK	KINDEN	5	-		177	0 0		*	3.6	001	1 14	0 03	003	100
LI, TRICILOROPETIANE LAG. 1 118 224 80 8 238 280 118 180 2700 210 210 2170 210 210 210 210 210 210 210 210 210 21	HCCP	HEXACTE OROCYCL OPENT ADJENE	33			227	0 0		8 27	36	000	1 20	0.00	97.0	0.01
LIJTWICH ONCYPTANE LATT I IN 224 80 8 28 28 28 118 186 2701 210 210 210 210 210 210 210 210 210 2	MATER	2													
THICH CHOCKTIVITE UP. 1 17 224 76 6 28 214 112 155 1400 200 200 M.A.NDP SYTHENS UP. 1 5 224 22 3 28 10.7 10.5 14.0 240 A.M.A.NDP SYTHENS UP. 1 5 224 2.2 4 28 14.3 10.5 13.8 17.0 2.40 A.M.A.NDP SYTHENS UP. 1 5 224 2.2 4 28 14.3 10.5 10.0 2.0 0.0 2.70 A.M.A.M.B. 1 4 224 18 3 28 10.7 10.3 10.0 2.00 2.70 A.M.B. 1 4 224 18 3 28 10.7 10.3 10.0 2.00 2.70 A.M.B. 1 5 2.0 A	71111 XI 2111	1,1,1-TRICH OROFTHANE TETRACHLOROFTHYT ENU	22		ž ž	222	0 8	20 OF	8 7 8 7	32.1	* ×	1 86	27 00	210	2 00
CANTAR	TRIC	TRICHLOROPHAYI ENE	3		11	224	76		171	214	112	182	1 2	700	2 00
1,2.DICH.GORCHTIAN! u.g.A. 1 4 224 1.8 3 28 10.7 10.3 130 10.00 200	DXYI.	G XYLENE	us A.		n •	224	22	~ 4	2 2	10.7	50 7	145	27 00	240	200
	12CH	1,2DICH.OROFILIANE	2	_	•				3	:	20.0	9	3	27	3

TABLE 5:10 b - GLOBAL SUMMARY OF CONTAMINANTS IN SECONDARY EFFLUENTS

ONTAM:	CONTAMINANT NAME	UNITS	CODE #	GLOBAL. # SAMPS. DET.	GLOBAL # SAMPS. TESTED	GLOBAL % FREQ. DET.	GLOBAL # PLANTS DET.	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GLOBAL GEO, MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONC.	GLOBAL MIN, CONC, > DL	DET. LIMIT (DL)
OLATHES														
CXBIC	RECMODICAL OROHINZ: NE		-	3	224	13	2	87	7.1	4 9 3	1 21	10.00	00 01	10 00
NA S	F DAY BENZENE	. V.	_	3	224	13	7	28	7.1	1 02	1 2 1	12 00	270	500
1110	LI DICH OROETHANE	.Van	_	3	224	1 3	3	78	10.7	101	110	230	2.20	2 00
XICDCE	CIS-1.2-DICHLOROETHYLENE	, w	-	2	224	60	7	28	7.1	101	17	4 10	2.20	7 (00
2STYR	STYRENE	. Nan	-	-	224	0.5	-	28	36	1 51	1 10	13 00	13 00	300
11 108	TRANS 1.3 DICHLOROPROPENE	.Van	_	-	224	0.5	-	82	36	1 00	901	240	2.40	200
IACTO	ALPHA-CIB OROTOLUENE	, Van	_	-	224	0.5	-	87	3.6	1 50	1 05	3 00	300	300
IDCFM	DICH ORODIT FOROMETHANE	.Van	2	_	224	0.5	-	87	3.6	10 07	112	53 00	53 00	8
100	1.1-DIGHLOROETHENE	υκΛ.	-	-	224	0.5	-	87	3.6	101	1 18	2 20	2.20	200
N. IO.	CHOUSENZENE	V	-	-	274	0.4	-	38	3.6	8	1 05	2.10	210	200

5.3.7 Summary of Contaminants in Tertiary Effluents

Only the Guelph WPCP of all the study plants provided tertiary treatment. The 128 contaminants that were not detected in the Guelph tertiary effluent including 12 that were not confirmed, are presented in Table 5-11(a). Also indicated are the 34 contaminants that were not detected in any sample type at any WPCP.

Thirty-one organic contaminants, 12 metals and cyanide were detected in at least one sample. Table 5-11(b) presents the listing of contaminants fround in the Guelph tertiary effluent. Metals were the most frequently detected contaminant, with 6 metals (Al, Cr, Cu, Hg, Sr and Zn) detected in more than 75 percent of samples. Only 2 pesticide and herbicide compounds (2,4-Dichlorophenoxyacetic acid and gamma-BHC) were present in more than 50 percent of the samples. The most frequently detected volatile organic compound was detected in only 50 percent of the samples. The most frequently detected base neutral and acid extractable compound was detected in only 30 percent of samples, and there were no dioxin/furan compounds detected in the Guelph tertiary effluent.

5.3.8 Summary of Contaminants in Raw Sludges

Table 5-12(a) presents a list of the 85 contaminants that were not detected in any of the raw sludge from any WPCP, including 6 compounds that were not confirmed. Also indicated are the 34 compounds that were not detected in any sample type at any WPCP.

Table 5-12(b) presents the summary of detected contaminants for all raw sludges. A total of 59 organic compounds, 15 metals and cyanide were detected in any sample. The most prevalent organic compounds were the pesticides and herbicides, with 11 compounds detected in at least 40 percent of the plants. Only 2 of the base neutral and acid extractable compounds, 4 of the volatile compounds and 1 dioxin compound were detected at more than 20 percent of the plants. All of the metals except beryllium were detected at greater than 64 percent of the plants. Cyanide was detected at 10 percent of the plants.

The most frequently detected contaminants were metals, with 12 metals detected in at least 80 percent of the samples, including 5 (Al, Hg, Sr, Zn, Cu) that were detected in all of the samples. Only 1 of the base neutral and acid extractable compounds and 1 volatile compound were detected in more than 30 percent of the samples, and only one dioxin (Octachlorodibenzodioxin) was detected in greater than 12

	CONFIRMED		NOT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	METALS AND CYANIDE		
BEUT	BERYLLIUM,UNFILT.TOTAL		
CCNFUR	CYANIDE-FREE,UNFILT.REAC.		
COUT	COBALT,UNFILT.TOTAL		
MOUT	MOLYBDENUM, UNFILT. TOTAL		
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS		ļ
muser.	ALCET VALE	PMPCRE	p-cresol*
P2AMET P2ATRA	AMETRYNE ATRAZINE*	FSIFCRE	FCABOL
PADIAZ	DIAZINON*	l	
P4EPAR	PARATHION ETHYL*	1	l .
P4MALA	MALATHION*	1	
P4MPAR	METHYLPARATHION* 2.4-DICHLOROPHENOL	1	
PM24DP PM24DT	24-DINTROTOLUENE		
PM24MP	24-DIMETHYLPHENOL		
PM24NP	2,4-DINTTROPHENOL*		
PM26DT	2,6-DINTTROTOLÜENE		
PM2NP	2-NITROPHENOL		•
PM46DP	2-METHYLA,6-DINTROPHENOL	1	
PM4BPE PM4CPE	4-BROMOPHENYLPHENYLETHER 4-CHLOROPHENYLPHENYLETHER		
PM4CPE PM4NP	4-CHLOROPHEN YLPHEN YLETHER 4-NTROPHENOL		
PMANAA	ALPHA-NAPHTHYLAMINE®		
PMB2EM	BIS(2-CHLORETHOXY)METHANE	1	Į.
PMB2IE	BIS(2-CHLOROISOPROPYL)ETHER	1	
PMB2NE	BIS-(2-CHLOROMETHYL)ETHER	- 1	
PMBBP	BUTYLBENZYLPHTHALATE	1	
PMBNAA PMDMP	BETA-NAPHTHYLAMINE* DIMETHYL PHTHALATE	1	
PMDMP PMNITB	NTROBENZENE	1	
PMNND	N-NTROSO-DI-PHENYLAMINE		
PMNNP	N-NTTROSO-DI-NPROPYLAMINE		
PMOCRE	O-CRESOL	1	l .
PMPCMC	P-CHLORO-M-CRESOL	i	
PMPHEN	PHENOL	- 1	
PN2CNA PNACNE	CHLORONAPHTHALENE®	1	ł
PNACNY	ACENAPHTHYLENE	1	ł
PNANTH	ANTHRACENE	1	
PNBAA	BENZOXA)ANTHRACENE	1	
PNBAP	BENZO(A)PYRENE	1	
PNBBFA	BENZO(B)FLUORANTHENE	- 1	
PNBIPH PNBKF	BIPHENYL BENZO(K)FLUORANTHENE	1	
PNCHRY	CHRYSENE	1	
PNDAHA	DIBENZOVA,H)ANTHRACENE®	1	
PNFLAN	FLUORANTHENE]	1
PNFLUO	FLUORENE]	
PNGHIP	BENZO(G.H.J)PERYLENE*		
PNINP PNNAPH	IDENO(1,2,3-CD)PYRENE * NAPHTHALENE	1	
PNPHEN	PHENANTHRENE		1
PNPYR	PYRENE	1	1
PODICH	DICHLORAN*		1
РОТОС	TRI-O-CRESYL PHOSPHATE*		1
X3001O X3245	2 CHLOROPHENOL		1
X3245 X3246	2,4,5-TRICHLOROPHENOL* 2,4,6-TRICHLOROPHENOL		1
X3PCPH	PENTACHLOROPHENOL		1
	DIOXINS AND FURANS		
P94CDD	TETRACHLORODIBENZODIOXIN*		1
P94CDF	TETRACHLORODIBENZOFURAN		
P95CDD	PENTACHLORODIBENZODIOXIN		
P95CDF	PENTACHLORODIBENZOFURAN		
P96CDD P96CDF	HEXACHLORODIBENZODIOXIN HEXACHLORODIBENZOFURAN	1	
P97CDP	HEPTACHLORODIBENZOFURAN	1	1
P98CDF	OCTACHLORODIBENZOFURAN		
	PESTICIDES, HERBICIDES, PCBS		
POPCNB	PCNB	POCAPN	CAPTAN*
PIBHCA PIBHCG	ALPHA-BHC(HEXCHLORCYCLHEXANE)	PIEND2 PIENDR	ENDOSULFAN II ENDRIN
PIBHCG PIDMDT	GAMMA-BHC(HEXCHLORCYCLHEXANE) METHOXYCHLOR	PIENDR PIENDS	ENDRIN ENDOSULFAN SULPHATE
PIMIRX	MIREX	PIHEPT	HEPTACHLOR
			1

[.] NOT DECTECTED IN ANY STREAM TYPE AT ANY PLANT

	CONFIRMED		NOT CONFIRMED
CONTAMINANT	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	PESTICIDES, HERBICIDES, PCBS		
PIOCHL PIPMIR PISTRO PITOX X2HCB	OXYCHLORDANE MREK PHOTO STROBANE* TOXAPIE HEXACILOROBENZENE YOLATILES	P324D X1HCB D X1HCCP X2124	2.4-DIGHLOROPHENOXYACETIC ACID HEXACHLOROBUTADENE* HEXACHLOROCYCLOPETADIENE 1,2.4-TRICHLOROBENZENE
BIOCTE BIVBR BIVBR BIVBR BIVBR BISBOCL BIEBRY BISBOCH BISSTYR BISSTY BISTY BISSTY BISTY BISSTY BISTY B	1-OCTENE VINYL BROMIDE* BROMODICHLOROBENZENE ETHYLBENZENE M. AND PAYLENES O.XYLENE STYRENE DETHYLENTER HEXANOL 2-OLLOROETHYLVINYLETHER* 1.1.1. TRIGGLOROETHANE 1.1.2. TETRAGGLOROETHANE 1.1.2. TETRAGGLOROETHANE 1.2. DICHLOROPROPENE 1.2. DICHLOROPROPENE 1.3. DICHLOROPROPENE TRANS-1.3. DICHLOROPROPENE TRANS-1.3. DICHLOROPROPENE BROMODICHLOROMETHANE BROMODICHLOROMETHANE BROMODICHLOROMETHANE CIS-1. DICHLOROPROPENE ALPHA-CHLOROTOLLENE BROMODICHLOROMETHANE CIS-1. DICHLOROETHYLENE CHLOROETHANE* CHLOROETHANE* CHLOROETHANE* CHLOROETHANE 1.1. DICHLOROETHYLENE TRICHLOROETHYLENE TRICHLOROETHYLEN	XIACRO XIACRY	ACRYLONITRILE*

CONTAM.	CONTAMINANT NAME	UNITS	24/QC CODE	UNITS QA/QC GLOBAL CODE # SAMPS. DET.	GLOBAL # SAMPS. TESTED	GLOBAL SFREQ. DET.	GLOBAL # PLANTS DET.	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GEO. GEO. MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONG.	GLOBAL MIN. CONC. > DL	DET. LIMIT (DI.)
CONVENTIONAL	IONAL													
8005	BOD, 5 DAY -TOTAL DEMAND	T/Sm	0	6	6	100.0	-	-	100.0	24 64	1.48	\$6.40	16.00	000
COD	CHEMICAL OX YOEN DEMAND	TAPE TO SERVICE TO SER	0	6	6	100.0	_	-	100.0	99 25	1 80	282.00	46 00	000
200	DISSOLVED ORGANIC CARBON	12g	0	•	٥	100.0	-	-	0001	8 74	1.19	10.90	7 00	000
NATE IN	AMMONIUM TOTAL FILT REAC.	13°	0	•	•	100.0	-	-	100 0	18.24	1 08	20.80	16.60	000
NNTKUR	NITROGEN TOT KIEL, UNP. TOT	me/L	0	6	•	000	-	-	100 0	23.22	1.17	3 00	19 80	000
-	(·LOG(II+(CONCN))		0	•	•	100.0	_	-	1000	7.10	2	7.49	682	00.0
1044	MIOSPHORUS, UNFILL TOTAL	J.	0 0	9 '	0.	0.001	_	_	1000	1 56	1 92	5.93	0.78	0.50
KSK	RESIDUE, PARTICULATE	2 .	۰ د	s o •	ю .	100.0	_	_	1000	32 21	1.74	71.80	17.10	000
TURB	TURBIDITY	mg/L	0	'n	•	1000	-	-	100.0	10.99	1.39	18.30	8.20	00.0
NNO27K	NITKILE PILL REACT		0	90 V	٥,	6 88	_	-	100.0	0.05	3.45	0.15	003	000
£	MINATES, FOTAL PILL REAC.	me Me	>	n	•	32.0	-	-	000	41.0	4 23	0.50	040	8
LALS A	METALS AND CYANIDE													
ALUT	ALUMINUM,UNPILT TOTAL.	ug/L	0	Ξ	Ξ	1000	-	-	100.0	1252.00	1 88	2900 00	200 00	200 00
CRCT	CHROMIUM, UNIVILIT. TOTAL	Z _e u	0	=	=	1000	-	-	1000	08.80	184	270.00	30.00	\$00.00
CULT	COPPER, UNPIL, T TOTAL	ug/L	0	2	2	100.0	-	-	1000	24.80	3.03	120.00	25 00	800 00
#85F	MERCURY, UNI-ILL TOTAL	ug∕l.	0	6	٥	100 0	-	-	100 0	0.17	1.73	0.39	0.07	000
SRUT	STRONTIUM, UNFILT TOTAL.	ug/L	0	=	=	1000	-	-	100.0	1170.70	F	1400.00	00 066	800.00
ZNO!	ZINCLUMPILLE TOTAL	, a	0	= '	= '	000	_	_	1000	959.60	1 30	1600 00	90 00	200 00
SCINE SE	CADMINE FREE CONFILL REAC.	3,	> 0	٠,	• :	8.7.8			100.0	14 60	4.19	2000	2,00	300
100	COBALT INDUTTOTAL	70m		۰.	= =	21.3	٠.		100.0	0.30	1.74	00.00	00:1	800 00
PBUT	LEAD UNPILT TOTAL	2	0		: =	, x			0.001	9 9	1 40	9000	0001	1000.00
AGLIT	SILVER UNPILT TOTAL	Van	0	۰	: =				8	26.4	000	800	0001	2000
MOUT	MOLYRDENUM UNFILT TOTAL	Lau.	0		: =				1001	200	1 43	900	80.08	80.05
NICT	NICKEL, UNIALT TOTAL	No.	0		=	9.1	-	_	1000	25 80	1.12	36.00	36.00	3000 00
E NEG	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS	MPOUNDS												
PM24MP	24-DIMETHYLPHENOL	J.S.	2	3	01	30.0	-	-	100.0	340	1.57	7.50	2 60	\$00,00
PMINIEN	PHENOI.	L'SU	2	9	10	30.0	-	-	100.0	1.99	1.59	4.40	340	300 00
PM24DP	24-DICH OROPHENOL	U.S.A.	_	-	10	10.0	-	-	100.0	2.87	1.55	9.90	066	200 00
PM24DT	24-DINITROTOLUENE	ug/L	-	-	10	100	-	-	100.0	1.70	1.49	\$ 30	\$ 30	300 00
PM26DT	2.6 DINITROTOLUENE	Le L	-	-	01	10.0	_	_	1000	1.77	108	7.70	7.70	20000
PM2NP	2.NITROPHENOL	ugΛ.	-	-	01	10 0	-	-	100 0	273	1.32	89	900	20000
PM46DP	2 METHYLA 6 DINTIROPHENOL	ug/L	2	_	10	10.0	-	-	100.0	3.18	2.14	27.60	27 60	200 00
MHZHM	BIS(2-CHORE-BIOXY)METHANE	ug/l,	_	_	10	100	-	-	100.0	1.31	2.34	14 80	14 80	200.00
MILZNE	HIS (2-OIL OROMICTHYL) FILLIFR	ug/L	7	_	10	10.0	_	-	100.0	1.86	1.97	12.70	12.70	300.00
MIIBP	BULYI.BENZYLMITBALATE	ug/l.	-	-	0	10.0	-	-	100 0	1.13	146	3.30	3.30	200 00
MNN	N-NITROSO-DI-NI-ROPYLAMINE	Ž,	- .	-	0	10.0	_	-	100 0	1.34	2.55	19 20	19.20	200 00
NBAA	HENZIXA)ANIBIKACENE	υ _κ Λ.	_	_	0.	10.0	_	-	100.0	1.29	2.23	12 60	12 60	200 00
NBKI.	HENZIK JIL LOKANI HENE	ug/l	_	-	10	100	_	_	100 0	1.16	1 62	8	9	200.00
YADOM	PYRENE PRINT A C'11 ODODRO, NOT	, and			2 :	0.01		-	1000	1 85	1 93	12.00	12 00	300 00
5	PENTACHLOROPHONOL.	ng/L	_	-	01	0.01	-	-	100.0	3.10	1 97	21.50	21.50	800.00

TABLE 5-8 b - GLOBAL SUMMARY OF CONTAMINANTS IN TERTIARY EFFLUENTS

			CODE	QC GLOBAL CODE # SAMPS. DET.	GLOBAL # SAMPS. TESTED	GLOBAL % FREQ. DET.	GLOBAL # PLANTS DET.	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GLOBAL GEO. MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONC.	GLOBAL MIN. CONC. *DL	DET. 1 IMIT (DL)
STICIDE	PESTICIDES, HER BICIDES, PC'BS													
P324D	24-DICHEOROPHENOXYACETIC ACID	ugA.	3	6	01	0 06	-	-	100 0	017	2.56	0 67	900	0.40
PIBHCO	GAMMA BHC(IB-XCIB-ORCYCI JIEXANE)		7	30	10	0 08	-	-	0 001	000	3.37	0.75	005	0.20
PIBHCB	BETA BHC (HEXCHOORCYCLIDEXANE)	۳,	-	e	01	30.0	-	-	1000	0.02	3.03	0.17	000	07 0
PUMDIT	METHOX YOU OR	2	-	7	10	200	-	-	100.0	000	1 90	0 26	0 70	90
P3SII V	SIL VEX	J.	3	7	10	200	-	-	100 0	900	- 34	010	010	90
NUK	I.NDRIN	η.		-	10	100	-	-	100 0	0 01	99	0.05	000	0 70
PIPCBI	PCB, FOTAI.	Ž	7	-	10	10 0	-	-	1000	0 0	1.55	0.16	910	0.80
24	1,24-TRICID OROBENZENE	Ž		-	9	10 0	_	-	100 0	0 01	8	900	900	0 70
VOLATILES														
XIJER	TELEACHLOROEDIYLENE	, P	_	\$	01	900	-	-	1000	3 50	4 30	80 00	\$ 80	40.00
XIIIII	1,1,1-1YICHI OROHTHANE	Ž,	-	4	10	40 0	-	-	1000	230	4 02	75 00	2.70	40 00
XIDGLE	1,1 DICHLOROETIBENE	2	-	2	10	0 07	-	-	100 0	1 56	261	14 00	610	40 00
HDBE	DUSTRIYL ETHER	, Van	-	-	10	0 01	-	-	100.0	1 28	2 19	12 00	12 00	40 00
:: :::::::::::::::::::::::::::::::::::	1,1-DIGII.OROHTHANE	ĽŊ.	-	-	10	100	-	-	1000	1 23	161	7.80	7 80	40 00
X112CE	1,2-DICIGOROFIHANE	S	-	-	10	10.0	-	-	100 0	1.10	1 37	2.70	270	40 00
CCIXCE	CIS-1,2 DICTB-OROFINIYLENE	Ž	-	_	10	100	-	-	1000	1.17	8	200	200	90 04

	CONFIRMED		NOT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS	PMPCRE	P-CRESOL*
P2AMET	AMETRYNE	F.VIFCRE	r-cataot
P2ATRA	ATRAZINE*	1	
ADIAZ	DIAZINON*	1	
4EPAR	PARATHION ETHYL*	1	
P4MALA	MALATHION*	- 1	
P4MPAR	METHYLPARATHION*	i i	
PM24DP	2,4-DICHLOROPHENOL	l l	
PM24DT	2.4-DINTTROTOLUENE	1	
PM24MP	24-DIMETHYLPHENOL	1	
PM24NP PM26DT	2.4-DINITROPHENOL* 2.6-DINITROTOLUENE	į.	
PM2NP	2-NTROPHENOL	l	
PM46DP	2 METHYLA,6 DINITROPHENOL	1	
PM4BPE	4-BROMOPHENYLPHENYLETHER	1	
PM4CPE	4-CHLOROPHENYLPHENYLETHER		1
PM4NP	4-NTTROPHENOL		1
PMANAA	ALPHA-NAPHTHYLAMINE*		1
PMB2EM	BIS(2-CHLORETHOX Y)METHANE		1
PMB2NE	BIS-(2-CHLOROMETHYL)ETHER	1	
PMBNAA PMDMP	BETA-NAPHTHYLAMINE* DIMETHYL PHTHALATE	1	
PMNNP	N-NTTROSO-DI-NPROPYLAMINE	1	1
PMOCRE	O-CRESOL	1	
PMPCMC	P-CHLORO-M-CRESOL		
PN2CNA	CHLORONAPHTHALENE*	1	i
PNACNE	ACENAPHTHENE*		
PNBAA	BENZO(A)ANTHRACENE	1	
PNBAP PNBIPH	BENZO(A)PYRENE	1	i
	BPHENYL BENTOKKET HOD ANTEKENT	1	1
PNBKF PNDAHA	BENZO(K)FLUORANTHENE DIBENZO(A,H)ANTHRACENE*	1	
PNFLUO	PLUORENE	1	1
PNGHIP	BENZOXG,H,DPERYLENE*	1	1
PNINP	DENO(1,23-CD)PYRENE*	1	
PODICH	DICHLORAN*	ı	
POTOC	TRI-O-CRESYL PHOSPHATE*	ŀ	
X3001O	2 CHILOROPHENOL	l l	
X3245 X3246	2.4,5-TRICHLOROPHENOL* 2.4,6-TRICHLOROPHENOL PENTACHLOROPHENOL		
	DIOXINS AND FURAN		
хэрсрн	TETRACHLORODIBENZODIOXIN*	}	
P94CDD	PENTACHLORODIBENZODIOXIN	1	
P95CDD	HEXACHLORODIBENZODIOX IN	1	
P96CDD		1	
	PESTICIDES, HERBICIDES, PCBS		
	PCNB		
POPCNB	ELDRIN ALDEHYDE	POCAPN	CAPTAN*
PIENDA	MIREX PHOTO	X1HCBD	HEXACHLOROBUTADIENE*
P1PMIR	STROBANE*	X2HCE	HEXACHLOROETHANE
P1STRO	TOXAPHENE		
PITOX	VOLATILES		1
	-Amarica		
	1-OCTENE		
B1OCTE	VINYL BROMIDE*	X1ACRO	ACROLEIN
B1VBR	BROMODICHLOROBENZENE	X1ACRY	ACRYLONTIRILE*
B2BDCL E1DIFE	DIETHYL ETHER	1	
LIHEX	HEXANOL 2-CHLOROETHYLVINYLETHER*		1
PM2CEE	1,1,1-TRICHLOROETHANE		1
XIIIIT	1,1,2,2-TETRACHLOROETHANE*		1
X11122	1,1,2 TRICHLOROETHANE*	1	1
X1112T	1,1-DICHLOROETHANE	1	1
X111CE	1,2 DICHLOROETHANE	1	
X112CE X112CP	1,2-DICHLOROPROPANE		1
X112CP X113DP	CIS-1,3-DICHLOROPROPENE TRANS-1,3-DICHLOROPROPENE	1	1
X113DR	ALPHA-CHLOROTOLUENE	1	1
XIACTO	BROMOETHANE*	i	1
X1BETH	BROMOFORM*	1	1
XIBROM	CIS-1,2-DICHLOROETHYLENE	Į.	1
XICDCE	CHLOROETHANE*	ĺ	
XICHLE	CHLOROMETHANE*		1
XICHLM	CARBON TETRACHLORIDE		1
XICTET			

TABLE 5-12 a - GLOBAL SUMMARY OF CONTAMINANTS NOT DETECTED IN RAW SLUDGES

	CONFIRMED	NO	T CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT	CONTAMINANT NAME
	YOLATILES		
XIDCPM XIDCLE XITI2D XITI2D XITICPM XITICPM XITICL XIVCL XIVCL XIJOCL XIJOCD XI	DICHLORODIFLUOROMETHANE 1,1-DICHLOROETHENE TRI-1,2-DICHLOROETHYLENE TRICHLOROFITHYLENE TRICHLOROFITHYLENE TRICHLOROFITHYLENE VEN'L CHLORIDE* 1,2-DICHLOROBEN'ZENE 3-GLOROTOLLENE CHLOROBEN/ZENE 3-CHLOROPROPENE*		

March Marc														
Comparison Com	CONTAM. INANT	CONTAMINANT NAME	UNITS QA/C (DRY COE WEIGIED)	C GLOBAL E # SAMPS. DET.	GLOBAL # SAMPS. TESTED	GLOBAL % FREQ. DET.	GLOBAL # PLANTS DET.	GLOBAL # PLANTS	GLOBAL % PLANT PREV,	GLOBAL GEO. MEAN	GLOBAL SPREAD FACTOR	GLOBAL MAX. CONC.	GLOBAL MIN. CONC.	
PRINCIPLE TOTAL ON VOER DELAKAN) MINTER, STATE TOTAL MINTER, STATE TOT		3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						ł						
Checked Device Network Deviced Name	CONVENT	IONALS												
DESCRIPTION OF CARRON CARRON MINERAL CARRON MINERAL CARRON OF MI	cop	CHEMICAL OXYGEN DEMAND	mg/kg 0	45	\$\$	100 0	33	31	100.0	19222145		2019047 62	4161 85	
NIRACIAN CREATION Marks 1 1 1 1 1 1 1 1 1	200	DISSOLVED ORGANIC CARBON		_	-	100.0	-	_	100 0	90 90909	000	90.90909	90909	
MACHINGENERIA COMPANIES March 10 March	NNONA	NERTE FET REACT.		-;	- ;	0 001	- ;	- ;	0.001	06.9	000	06.9	06.9	
Committee Comm	NNIKOK	NIROGEN-TOT KIEL, UNP TOT		7		0001	4	X :	100.0	3089783	86.7	14829 93	18 1	
MAJANISIANIA 1701. mg/s 0 11 1201. mg/s 0 12 1201. mg/s 0 12 12 12 12 12 12 12	Ī	(TOXITH(CONCN))		64	\$ 1	000	Z.	X	0001	603	01.1	732	473	
AMMONINIA TOTAL TOTAL MAKE OF STATES	54	PIOSITIONOS, UNITELI TOTAL		7.5	7 ;	0001	8 ;	8 ;	0000	20347 70	443	68202.08	2.23	
ALIMENIALIZATION OF THE RACE	KSI	KESIDUE, IOIAI.		5	5	0001	34	* ;	0.001	3278351	181	82800 00	6730 00	
MANTENDERING FOLDER TOTAL Market	KSHOI	KESIDUE, FOLLOSS ON IGNI		5 5	5	0.00	4 :	X :	100.0	20803 05	177	51 591 00	4370.00	
HIRNOLIC (AAL) High	MANUALE	METRICAL FILL REAC.		÷ 5	0 9	6.76	7 7	5.5	0.00	26.1.92	4 04	18000 23	1097.42	
### MERCHWINDLINGT TOTAL ### 10 51 1000 34 34 100 98374 23 1034082 CHANGING HENT TOTAL ### 10 51 1000 34 34 100 98374 23 1034082 CHANGING HENT TOTAL ### 10 51 1000 34 34 100 98374 12 12 1034082 SHOKING HENT TOTAL ### 10 51 1000 34 34 100 98374 12 12 1034982 SHOKING HENT TOTAL ### 10 51 1000 34 34 100 98374 12 12 13 1034982 SHOKING HENT TOTAL ### 10 51 1000 34 34 100 98374 12 12 13 1034982 CHANGING HENT TOTAL ### 10 51 1000 34 34 100 98374 12 13 13 13 13 13 13 13 13 13 13 13 13 13	MINOL.	MENOLICS (4AAP)		₹ ₹	20	82.0	58 7	2.2	85.3	82.34	3.54	585 11	16 32	
ALIMINUMUNITIETOIAL. mg/kg 0 51 51 1000 34 34 14 1000 891574 231 10204082 MERCHYR UNDERLETOIAL. mg/kg 0 55 50 1000 31 31 31 1000 60511 172 46588 STRONTHINGINETITOIAL. mg/kg 0 51 51 1000 34 34 34 1000 60511 172 46588 STRONTHINGINETITOIAL. mg/kg 0 51 51 1000 34 34 34 1000 60511 172 46588 STRONTHINGINETITOIAL. mg/kg 0 51 51 1000 34 34 34 1000 60511 172 46588 CROMMINGINETITOIAL. mg/kg 0 50 51 1000 31 31 31 34 971 1010 31 31 31 31 31 31 31 31 31 31 31 31 31														
MACHINIMUM LINELITOIAL Maging 51 51 1000 34 34 1000 393.574 2.5 102040 8.2	METALS													
MACHINE LINEAR TOTAL WATER TOT		N N N N N N N N N N N N N N N N N N N		-	ş	0.001	34	34	000	0815 74		0304040	22.402.0	
STOCHMELINGENT TOTAL mg/s 0 51 51 1000 34 51 1000 6051 172 465588 STOCHMELINGENT TOTAL mg/s 0 51 51 1000 34 51 51 1000 34 51 1000 34 1	ICALL	MERCURY UNPILIT TOTAL		9	9	0001	: =	: :	0001	2.33	191	918	150	
SINCKHIMMURELI TOTAL MEMORIANELL TOTAL MEMORIANEL	120	COPPER UNFOLT TOTAL		4	40	0 001	33	33	0 001	16.00	1 72	4055.88	74.75	
AMENICINET TOTAL.	152	STRONTIUM, UNPILITOIAL		31	31	0.001	X	, X	100.0	231.70	1 97	1206.90	36.13	
ARSINGLINELLY TOTAL mg/s 0 31 96 33 34 971 96 36 </td <td>JON</td> <td>ZINC, UNPIL T TOTAL.</td> <td></td> <td>15</td> <td>51</td> <td>100.0</td> <td>34</td> <td>34</td> <td>0 001</td> <td>905 39</td> <td>2 39</td> <td>16334 66</td> <td>280 44</td> <td></td>	JON	ZINC, UNPIL T TOTAL.		15	51	100.0	34	34	0 001	905 39	2 39	16334 66	280 44	
CAMMINITED TOTAL mg/s 0	SUF	ARSENIC, UNFILT TOTAL.		20	15	0 86	33	34	97.1	613	2.01	41.50	225	
Head-Unfull, Trotal. mg/s 0 48 94 96 31 31 32 94 94 94 94 94 94 94 9	RIJ	CHROMIUM, UNPIL 1, TOTAL.		20	15	0 86	33	34	1.76	301 43	3.68	8235 29	44 28	
NCKELJANIAL TOTAL	5	I J-AD, UNI-II.T TOTAL.		30	40	086	31	32	6 96	173.99	2 24	5179 28	42 63	
SUMPLIANTED TOTAL MARA 0 44 49 99 12 7 30 99 13 39 11 259 12 258 2 2	101	MICHEL HADEN TRUCKED		æ ;	06	8 8	.	33	6.69	3 5	193	22.90	0.93	
COMATITIONAL TOTAL MATERIAL MATER	120	CADMINATINGS T COTAL		4 6	9 5	66	8 12	2 6	56	7160	250	2338.82	10.54	
MCCHATINITITYTYAL mg/a 0 10 11 12 12 13 13 13 13 13	170	SILVER UNPILT TO CAL.		9	3 2	0 00	27	3 2	3. 3	2 2	2 61	1830	13/	
CVANIDE-PRELIGNATION TOTAL	OUT	COBALT, UNITLY TOTAL.		30	41	73.2	55	30	73.3	9 29	4 69	1838 01	3.58	
CYANIDE PRIED TOTAL. mg/s 0 1 40 75 1 30 100 002 274 048 BENTILLIM LINE IT TOTAL. mg/s 0 1 20 40 1 24 42 050 355 1.01 TITRAL AND ACID EXTRACTABLE COMPOUNDS TITRAL AND ACID EXTRACTABLE COMPOUNDS THENDS I MCRISOL BENTILLIM LINE BY 1 1 42 11 24 11 2	1001	MOLYBDENUM, UNPB.T TOTAL		23	37	62.2	81	28	23	5 80	2.88	256 41	232	
MCCHASAN ACID EXTRACTABLE COMPOSINDS 1	CNFCK	CYANIDE-PREE, UNPILIT REAC.	mg/kg 0	e .	40	7.5	6	30	100	0 0 2	2.74	048	0.23	
MCCHASAN ACID EXTRACTABLE COMPOUNDS MCCHASAN ACID EXTRACTABLE COMPOUNDS MCCHASAN ACID EXTRACTABLE COMPOUNDS MCCHASAN ACID EXTRACTABLE COMPOUNDS MCCHASAN ACID EXTRACTABLE MCCHASAN ACID EX	- 03	BEKTILLIUM, UNFILL TOTAL	10 Mg/kg 0	-	2	0 4	-	77	4.2	0.50	3 55	1.01	101	
M-CRISOL	MASENEIL	TRAL AND ACID EXTRACTABLE CO	MPOUNDS											
PHIN-01.	MMCRB	M-CRI-SOL	10.0/4.6	42	15	82.3	59	75	** 3	10847 30		0649056.60	09.010	
PHINAMPHENE	MPBN	Prinkol,	uk/kg 2	15	15	29.4	13	34	38.5	731280		26401.30	11702 60	
HTM-NATHER	NNAPH	NAPPRINALENE		•	15	118	, 5	34	14.7	3823 30		2653061 20	3400.30	
HINTO HENCYCHATHIA A III. HINTO HENCYCHATHIA A III. HINTO HENCYCHATHIA A III. HINTO HENCYCHATHIA UAA I 2 31 79 2 34 34 540 31 27 34 37 37 37 34 34 34 34 34 34 34 34 34 34 34 34 34	NHIN	PBENANTHENE	ug/kg 1	9	51	8 ::	۰	34	17.7	156150		24316.50	3429 20	
URKYSTINE UNA	MBHP	BUTYLBENZYLISTINA A DS	ug/kg 1	4	51	7.8	4	34	8 11	3445 60	2.25	48701 NO	17067 40	
CHAYSTRINE	MB28E	BIS(2 CHLOROISOPROPYL)BING-R	ug/kg i	2	51	3.6	2	34	5.9	3464 00	3 02	958199 40	97130 20	
MARCHINEME UACA 1 2 31 39 2 34 59 3108.30 197 2788 BP	NCHRY	CHRYSPINE	Ug/kg 1	2	51	3.9	2	34	5.9	3026 90	1 93	21549 80	6584 00	
PHENNE	NITAN	HUORANTHENB	ug/kg 1	2	51	3.9	2	34	6'5	3083 50	1 97	27878 80	8350 60	
DITTENT	NETK	PYRENE	18/kg	7	S	3.6	2	34	65	4522 60	187	20740.70	8039 80	
NITROBINATION	HOP!	DISTENSI ETHER	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-	5	2.0	-	34	5.9	729610	181	14788 70	14788 70	
N NTROSO DI PIENYI AMINI	MNLH	NITROHENZENE	ug/kg]	_	51	2.0	-	34	2.9	3405 40			0204081 60	
ACHAMITIVE	MNND	N NITROSO DI PHENYLAMINE	ug/kg 1	-	51	2.0	-	34	5.9	2972 50			8530 30	
ANTHRACE:H	NACNY	ACENAMINITIENE	ug/kg 1	-	15	2.0	-	34	2.9	4406 70	183	13187 30	13187 30	
### BENZARBITATORANTHENE #### 1 1 51 2.0 1 34 2.9 2924.20 182 7811.40	ILINYN.	ANTHRACT: NR	ug/kg 1	-	S	2.0	-	34	2.9	2919 80	1 80	5484.70	5484 70	
	NBH!A	BENZXXBJ1JJORANTHENE	ug/kg 3	-	2	2.0	-	34	5.9	2924 20	1 82	7811 40	7811 40	

50 50 14 54 54 10<	500 20 34 38 8 8.50 360 199 10 120 4 34 18 8 8.50 360 14 30 20 4 34 11 77 7 70 4 41 14 30 20 1 34 29 340 344 314 20 1 34 29 300 294 234 20 1 34 29 300 294 230 20 1 34 29 300 294 230 44 1 34 29 300 294 230 300 44 1 1 34 29 300 244 300 244 300 44 1 1 34 29 300<	CONTAMINANT NAME UNITS QAQC: GLOBAL, DRY CODE # SANIPS, WEIGHT) DET.
100 20 34 34 54 540 36	50 500 20 34 98 k 850 360 361 50 170 6 34 177 720 412 110 50 60 1 34 177 720 412 110 50 60 1 34 18 54 24	
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78.4 27 34 79.4 88.70 3.18 239.56 4.5 28 34 67.7 88.70 5.90 10.10 4.5 28 34 67.7 88.70 3.74.70 10.10 4.5 1 14 5.9 4.70 2.40 10.10 4.1 1 1 4.7 4.70 2.40 2.40 10.10 4.1 1 4 2.9 4.70 2.40 2.40 2.40 2.40 9.1 1 4 4.7 4.70 2.40 </td <td>31 784 27 34 794 8810 318 2895 60 31 745 28 34 823 93 20 650 7742 70 31 451 19 34 823 93 20 650 7742 70 31 451 19 34 823 93 20 650 7742 70 31 451 19 34 879 4730 249 100 100 100 31 451 19 30 470 340 340 249 100 349 741 340</td> <td></td>	31 784 27 34 794 8810 318 2895 60 31 745 28 34 823 93 20 650 7742 70 31 451 19 34 823 93 20 650 7742 70 31 451 19 34 823 93 20 650 7742 70 31 451 19 34 879 4730 249 100 100 100 31 451 19 30 470 340 340 249 100 349 741 340	
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373 115 34 441 4580 513 510 373 11 34 441 4580 518 340 119	37 15 34 441 480 313 319,30 37 15 34 341 340 313 319,30 35 16 34 471 340 238 340 35 13 34 342 340 238 340 23 12 34 343 350 228 340 23 12 34 353 50 224 5150 23 12 34 353 50 224 5150 23 11 34 353 50 224 5150 157 16 36 20 227 130 230 157 18 20 22 210 230 490 10 118 6 34 177 40 22 210 20 118 6 34 177 40 22 210 20 18 <td>-</td>	-
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118 6 34 177 1640 227 10530 19 3 34 88 400 222 23.00 19 2 34 59 400 237 101.00 19 2 34 59 1530 218 90.30	11 8	3
39 3 34 88 4400 2.27 1011.00 39 2 34 39 4400 2.27 1011.00 39 2 34 59 35.50 2.18 90.50	59 3 4 8 4 00 2.72 23.00 59 2 34 59 4 00 2.72 23.00 39 2 34 59 4 00 2.72 10.100 20 2 34 4 0 2.73 11 90.20 23 1 4 12 134.90 386 47146.40 23 1 34 41.2 134.90 386 47146.40 19 9 34 2.65 880.00 2.60 2481.39 19 9 34 2.95 841.60 2.31 1472.20 20 1 34 2.95 841.60 2.31 1472.20 20 1 34 2.9 6.99.40 1.96 0310.99 20 1 34 2.9 641.20 1.99 1.94 2.9 20 1 34 2.9 643.20 1.99 1.97 2.02 </td <td>ug/kg 3</td>	ug/kg 3
39 2 34 39 440 23) 10130 39 2 34 59 3530 218 9030	39 2 34 59 400 227 101,00 39 2 34 59 350 218 9030 314 14 34 412 13450 386 4714640 235 12 34 412 13450 386 4714640 157 8 14 26 867 2.60 248139 157 8 14 215 84160 2.60 248139 20 1 4 21 84160 2.1 17720 20 1 34 29 63940 190 31628 20 1 34 29 6410 190 31210 20 1 34 29 6412 199 31412 20 1 34 29 6412 199 31412 20 1 34 29 6430 199 31412 20 20 <	
	314 14 34 412 134500 3166 4714640 225 12 34 255 1870 42 952810 156 9 34 255 8400 2.0 2411390 59 3 44 25 84100 2.1 1471200 20 1 34 29 9340 190 0310390 20 1 34 29 9340 190 031030 20 1 34 29 64120 199 731210 20 1 34 29 6430 199 731210 20 1 34 29 6430 199 731210	ug/kg 3 2
	14 14 34 41 1345 90 386 47146440 153 123 10 424 9523810 196 9 34 256 389 9 256 2481390 157 8 34 256 389 9 251 1471200 25 3 34 28 841 60 25 31 1471200 26 31 34 29 394 60 196 310280 26 31 34 29 348 34 34 34 29 348	
	14 14 34 41 134590 386 4714640 23 5 12 34 35 3 123510 4 24 952810 196 9 34 25 3 84150 25 4 241399 25 4 27 27 27 27 27 27 27	
	13	-
314 14 34 412 134590 3.86 4714640	19 6 9 34 25 5 84 500 2.00 244) 19 6 19 19 19 19 19 19 19 19 19 19 19 19 19	-
31 4 14 34 412 1345 90 3.86 47/14640 23 5 12 34 35.3 1225 10 4.24 95238 10	15.7 8 34 21.5 841,60 2.51 1472,00 2.0 3.4 8.8 661,30 19.0 316,280 2.0 2.0 3.4 2.9 6.94,00 19.0 316,280 2.0 3.4 2.9 6.94,00 1.9 7.94,50 2.0 3.4 2.9 6.41,20 3.9 3.97,02 2.0 3.4 2.9 6.43,70 2.0 3.9 3.97,02 2.0	-
314 14 34 412 134590 386 4714640 235 12 34 353 122510 424 952810 196 9 34 265 88070 260 2481390	59 1 34 88 6.6130 190 316.280 20 1 34 29 9440 190 0310.89 20 1 34 29 9440 191 179.90 20 1 34 29 64120 193 1712.00 20 1 34 29 64120 199 1717.02 20 1 34 29 64370 200 767.22	-
314 14 34 412 134590 386 4714640 235 12 34 353 123510 424 9528810 196 9 34 265 89070 2.60 2481390 157 8 34 255 84160 2.51 1477200	20 1 34 29 63940 196 601080 20 1 34 29 94460 182 174930 20 1 34 29 64120 199 731210 20 1 34 29 64370 199 39702 20 1 34 29 64370 200 749230	-
314 14 34 442 134590 316 4714640 225 12 34 353 12370 42 95 9512 150 9 34 26 89070 2.60 2481390 15.7 8 834 25.5 8400 2.0 147200 5.9 3 34 8 66.30 199 18.62.80	20 1 34 29 94400 182 174940 20 1 34 29 64120 199 7312.10 20 1 34 29 64320 199 7372.02 20 1 34 29 64370 200 7672.20	-
314 14 34 412 134590 386 47146490 235 12 34 333 122310 42 952810 196 9 34 26 89070 26 2481390 157 8 34 23.5 84160 251 1417200 5 9 3 34 8 6630 190 316280 2.0 1 34 29 63940 190 001030	20 1 34 29 64120 199 731210 20 1 34 29 64370 2.00 7692 30 20 1 34 2.9 64370 2.00 7692 30	1 847
314 14 34 41.2 134540 314 474 64 13 12 34 35.3 123510 4.34 95.348 10 19 6 9 34 26.5 89770 2.60 24813 80 15 7 8 34 2.5 89770 2.60 24813 80 2 9 3 34 8.8 86130 1.90 116280 2 0 1 34 2.8 80400 1.90 100 2 0 1 34 2.9 94800 180 1749 90	20 1 34 29 643.70 200 7692.30	
314 14 34 412 1345 90 3166 47146 40 25	N. 10.1.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

percent of the samples. The most frequently detected pesticide and herbicide compound was detected in 78 percent of the samples and 16 of the pesticide/herbicide compounds were detected in more than 20 percent of samples.

5.3.9 Summary of Contaminants in Treated Sludges

Table 5-13(a) presents a list of the 81 contaminants that were not detected in any treated sludge samples from any WPCP, including 5 contaminants that were not confirmed. Also indicated are the 34 contaminants not detected in any sample type at any WPCP.

Fifteen metals and 64 organic compounds were detected in at least one treated sludge sample. Table 5-13(b) summarizes the contaminants detected in treated sludges. The most prevalent organic compounds were the pesticides and herbicides, with 10 compounds detected at more than 40 percent of the plants. The most prevalent base neutral and acid extractable and volatile compounds were detected at fewer than 35 percent of plants. One dioxin compound (Octachlorodibenzodioxin) was detected at 65 percent of the plants. There were 13 metals detected at more than 86 percent of the plants and 6 (Ag, Al, Cr, Cu, Sr and Zn) detected at all of the plants.

The most frequently detected contaminants were metals, with 13 metals detected in at least 82 percent of samples, and 6 detected in all the samples. None of the base neutral and acid extractable, or volatile compounds were detected in more than 30 percent of samples. One dioxin compound was detected in 53 percent of samples, and the remaining dioxins were detected in less than 20 percent. The most frequently detected pesticide and herbicide compound was detected in 68 percent of samples, and 16 of the pesticide/herbicide compounds were detected in more than 20 percent of the samples.

5.3.10 Summary of Contaminants Detected in Any Sample Type

Table 5-14 presents a summary of contaminants detected in any sample type. The Table provides for each of the five contaminant groups, the number of compounds detected, the maximum percentage prevalency (ie. the maximum percentage of all WPCPs in which the contaminant was identified) for any contaminant in the group and the maximum percentage frequency (ie. the maximum percentage of all samples of a given type in which the contaminant was identified) for any contaminant in the group.

As noted throughout Section 5.3 metals were the most prevalently (most WPCPs) and most frequently detected contaminants in all sample types.

	CONFIRMED		NOT CONFIRMED
	CONFINALED		
CONTAMINANT	CONTAMINANT NAME	CONTAMINANT CODE	CONTAMINANT NAME
	METALS AND CYANIDE		
CCNFUR	CYANIDE-FREE,UNFILT.REAC.		
	BASE NEUTRAL AND ACID EXTRACTABLE COMPOUNDS	ľ	
PO A S CE T	AMETRICA	PMPCRE	P-CRESOL*
P2AMET P2ATRA	AMETRYNE ATRAZINE*	i	
P4DIAZ	DIAZINON*		
P4EPAR	PARATHION ETHYL*	l	İ
P4MALA P4MPAR	MALATHION* METHYLPARATHION*		
PM24DP	24-DICHLOROPHENOL		
PM24DT	2,4-DENTIROTOLL'ENE	1	
PM24MP	2,4-DIMETHYLPHENOL	ţ	
PM24NP PM26DT	2.4-DINITROPHENOL® 2.6-DINITROTOLUENE	i	
PM2NP	2 NTTROPHENOL	ł	
PM46DP	2-METHYL4,6-DINTTROPHENOL	Ī	· ·
PM4BPE PM4CPE	4-BROMOPHENYLPHENYLETHER 4-CHLOROPHENYLPHENYLETHER	1	
PM4CPE PM4NP	4-NTROPHENOL	i	
PMANAA	ALPHA-NAPHTHYLAMINE*	l l	
PMB2EM	BIS(2-CHLORETHOXY)METHANE	I	
PMB2IE PMB2NE	BIS(2-CHLOROISOPROPYL)ETHER BIS-(2-CHLOROMETHYL)ETHER	1	
PMBNAA	BETA-NAPHTHYLAMINE*	i	1
PMDMP	DIMETHYL PHTHALATE	i	
PMOCRE	O-CRESOL	1	į .
PMPCMC PN2CNA	P-CHLORO-M-CRESOL CHLORONAPHTHALENE®	1	
PNACNE	ACENAPHTHENE*	1	
PNBBFA	BENZO(B)FLUORANTHENE		
PNDAHA	DIBENZOXA,H)ANTHRACENE®	i	
PNGHIP PNINP	BENZO(G,H,I)PERYLENE • IDENO(1,2,3-CD)PYRENE •	1	
PODICH	DICHLORAN*	1	ľ
POTOC	TRI-O-CRESYL PHOSPHATE*	1	
X30010	2-CHLOROPHENOL	1	
X3245 X3246	2,4,5-TRICHLOROPHENOL* 2,4,6-TRICHLOROPHENOL	i	
ХЗРСРН	PENTACHLOROPHENOL	İ	
	DIOXINS AND FURANS		
P94CDD	TETRACHLORODIBENZODIOXIN*	1	
P94CDF P96CDF	TETRACHLORODIBENZOFURAN HEXACHLORODIBENZOFURAN	1	
P97CDF	HEPTACHLORODIBENZOFURAN		
P98CDF	OCTACHLORODIBENZOFURAN		
	PESTICIDES, HERBICIDES, PCBS		
PIENDA	ELDRIN ALDEHYDE STROBANE*	POCAPN X1HCBD	CAPTAN* HEXACHLOROBUTADIENE*
PISTRO PITOX	TOXAPHENE	ATHCBD	HEXACHLOROBE TABLETE.
	VOLATILES		
BIOCTE	1-OCTENE	X1ACRO	ACROLEIN
BIVBR	VINYL BROMIDE •	XIACRY	ACRYLONTIRILE*
B2BDCL B2STYR	BROMODICHLOROBENZENE STYRENE		
ELDIFE	DIETHYL ETHER	1	
PM2CEE	2-CHILOROETHYLVINYLETHER*	1	
X11122	1,1,2,2-TETRACHLOROETHANE®	i	
X111ZT X111CE	1,1,2-TRICHLOROETHANE* 1,1-DICHLOROETHANE		
X112CE	1,2-DICHLOROETHANE	1	
X112CP	1,2-DICHLOROPROPANE		
X113DP	CIS-1,3-DICHLOROPROPENE		
X113DR X1ACTO	TRANS-1,3-DICHLOROPROPENE ALPHA-CHLOROTOLUENE		1
X1BDCM	BROMODICHLOROMETHANE		1
XIBETH	BROMOETHANE*		
X1BROM X1CDCE	BROMOFORM* CIS-1,2-DICHLOROETHYLENE		
XICHLE	CHLOROETHANE*		
X1CHLM	CHLOROMETHANE*		1
X1CTET X1DCFM	CARBON TETRACHLORIDE		1
	DICHLORODIFLUOROMETHANE	1	1
X1DCFM X1DCLE	1.1-DICHLOROETHENE	ı	

TABLE 5-13 a - GLOBAL SUMMARY OF CONTAMINANTS NOT DETECTED IN TREATED SLUDGES

	CONFIRMED	NO	OT CONFIRMED
CONTAMINANT CODE	CONTAMINANT NAME	CONTAMINANT	CONTAMINANT NAME
	YOLATILES		
TT12D TTCFM			
ITCFM IVCL	TRI-1,2-DICHLOROETHYLENE* TRICHLOROFLUOROMETHANE* VINYL CHLORIDE*		
1VCL 212CB 213CB	1,2-OICHLOROBENZENE 1,3-DICHLOROBENZENE		
23CTO 2CBEN	3-CHLOROTOLLIENE CHLOROBENZENE		
2CPPE	3-CHLOROPROPENE*		
		ł	
	Ì	1	
	1	1	

TABLE 5-13b - GLOBAL SUMMARY OF CONTAMINANTS IN TREATED SLUDGES

COMPATIONALS COMPATIONAL						TESTED	DET.	DET.	PLANTS	PREV.	MEAN	FACTOR	CONC	CONC.
AMERICAN TOTAL TRIANCA (14, 12, 12, 12, 12, 12, 12, 13, 13, 13, 13, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14	ONVENT	IONALS												
AMMONISMENTAL INTOLAL MAPLE TOTAL MAPLE TOTAL MAPLES TOTA	COD	CHEMICAL OXYGEN DEMAND	and the	0	90	36	0 001	53	62	1000	508097.94	4 65	2483375 96	2760 08
NINCALLIMENTION AND ACTOR MATERIAL TOTAL NINCALLIMENT TOTAL NINCAL	X-E-IN	AMMONIUM, TOFAL FILT REAC.	mg/kg	0 0	3 9	1 9	1000	5.2	6.5	0.001	17038 28	177	204117 65	1440000
HEINDLES (AAA) HEINTRE, IDIAL HEINDLES (AAA) HEINTRE, IDIAL HEINDLES (AAA) HEINTRE, IDIAL HEINDLES (AAA) HEINTRE, IDIAL HEINDLES (AAA) HEINTRE, IDIAL HEINDLES (AAA) HEINDL	N KUK	NIIKOGEN-TOT-NEL,UNI TOT	and and			47	0.001	. 3	7 2	0.001	7.17	1.09	984	5.70
HENDING, TOTAL TOTAL WITH MENDING, TOTAL TOTAL WITH WE WITH WE WITH	2 2	DATA CONTRACTOR IN TOTAL			. 5	: 3	1000	56	58	0 00 1	76638 67		6094159 99	19410 00
NEW ORLING TO CAS ON UNIT TO LAT. NEW ORLING TO CAS ON UNIT TO CAS ON UNIT TO LAT. NEW ORLING TO CAS ON UNIT TO		PHENNIN TOTAL	4		9	\$0	100.0	*	34	0 001	80434 04		479900 00	2210 00
NITRATES (OTAL HT NEAC. m_AA 0 41 49 837 29 315 610	0115	RESIDER TOT LOSS ON ION:	4	. 0	20	8	0 001	34	34	100 0	43379.33	319	240560 00	1180 00
PHENDILCS (AAAP)	NOIN	NITRATES, FOTAL, FILT REAC.	- I	. 0	22	92	88 5	19	50	950	42 68	2 29	503 61	77.6
STRONGHILT TOTAL ALL MANIELLE I TOTAL ALL MANIELLE ALL MANIELLE I TOTAL ALL MANIELLE	MINOL.	MENOLICS (4AAP)	m Age	0	7	6	k3 7	53	33	87.9	43.05	3.14	1062.50	0.80
SUPPER, UNFILIT TOTAL	ETALS													
MACHINIAN LINEAR LINE	5	SELECT THE PROPERTY OF	a Van	0	4	4	100 0	30	30	100 0	37.78	233	240.73	230
CORPLEXIONAL TOTAL WELLINGT T	=	ALTIMINIM LINES TOTAL	4		20	20	0 001	34	34	0.001	1071594	2.82	81967 21	391 42
STRONTING INFERT TOTAL WAYS OF 50 50 50 1000 34 34 1000 2409 3 24 11864 6 ASSECTIONET TOTAL WAYS OF 50 50 50 1000 34 1000 2409 3 24 11864 6 ASSECTIONET TOTAL WAYS OF 50 50 50 1000 34 14 100 2409 3 24 11864 6 ASSECTIONET TOTAL WAYS OF 50 50 50 1000 34 100 2409 3 24 11864 6 ASSECTIONET TOTAL WAYS OF 50 50 50 50 50 50 50 50 50 50 50 50 50	5	CHROMIUM UNPIL I FOLAL	Ing/kg	0	200	20	0 001	34	34	0 001	333 06	3.59	7488.15	5.45
STATE CHARLY TOTAL.	151	COPPLE UNPIL T FOTAL	m.As	0	45	4.5	1000	33	33	0 001	732 24	216	4962.09	28.22
ASSECTIONAL TOTAL. MAKEOUR VICTORIAL VICTORIAL TOTAL. MAKEOUR VICTORIAL	5	STRONTIUM, UNPILT TOTAL.	mg/kg	0	20	\$0	0 001	34	34	0.001	240 93	2.54	1366 46	625
##SHCICINALLYOLAL ###SHCICINALLYOLAL ###SHCICINALLY	101	ZINC,UNPILITIOTAL	B.VNu	0	20	20	0 001	34	34	0 001	988 90	2.57	15126.05	\$2.05
MECHEL TOTAL	5	ARSENIC, UNFILT TOFAL.	mg/kg	0	46	\$0	0 86	33	34	176	540	2.06	23 56	0.43
STATE CONTINUENT CONTINUE	5	MERCURY, UNFILT TOTAL	16/48	0 4	6 9	200	0 86	33	7,	7.5	7 7	507	33.74	740
VECKEL, INTRINTED LATE:	1 1	CLADIUNER LISOIAL	# 10 m	-	2 3	2 2	0.86	5 5	3, 78		19061	2.98	4337 62	010
COMMINIMENT TOTAL MAN A DIRECTOR TOTAL MAN	5 5	NICKEL UNTIL T TOTAL	1	. 0	42	2.5	93.3	27	30	006	7295	295	2393.36	0.70
COMATIONEL TOTAL might 0 32 34 821 24 84 24 24 24 33 34 BREYALLING INPELIT TOTAL might 0 23 34 1 26 94 1 24 043 33 34 BREYALLING INPELIT TOTAL might 0 1 2 94 2 041 245 833 BREYALLING INPELIT TOTAL might 0 1 2 94 2 041 245 053 MCRESOL with 1 2 9 34 2 043 34	5	CADMIUM,UNFILT FOTAL.	mg/kg	0	41	45	1 16	27	31	903	10 47	3 98	17564	1,73
MOLYBENIMALINFELL TOTAL. mg/k 0 23 34 97 18 26 692 041 244 853 393 394 914 101AL. mg/k 0 1 1 26 9 9 1 1 24 42 041 244 853 393 394 914 101AL. mg/k 0 1 1 26 9 1 1 24 42 041 124 063 394 914 101ALANDACID EXTRACTABLE COMPULINDS M.CHESOL MCRESOL MCRESOL Mg/k 1 15 50 50 0 12 34 553 5281 80 82 521899 90 817 2838 50 62 63 9 14 255 52 523 50 817 2838 50 62 62 62 62 62 62 62 62 62 62 62 62 62	5	COBALT,UNFILT TOTAL	# Volume	0	32	36	1 28	3	58	857	914	2.75	38.35	2.34
The composition of the composi	<u> </u>	MOLYBIX: UM, UNFILL TOTAL.	10 P	-	57 -	z ;	0 0	8 -	9 7	7.6	0 41	233	83.33	1 32
MACTIBLE COMPUTIONS MACTIBLE COMPUTIONS		BIRYLLION, ONFE.: FOLAL.		>	-	8	2	-	5	7	4	7	6	ĝ
PHENATIRE PACKESO	SENE	JTRAL AND ACID EXTRACTABLE CO	MPOUNDS											
HITTAGENITATION U.M. 1	MCRE	M CRESOL	N.A.	<u>.</u> .	2 :	0 5	30 0	12	34	353	5281 80	8 20	2211895 90	7750 00
CHRYSHINE CHRYSHINE	N CHES	BITTYS BENZYE METHAL ATT	3 : 3 :		7 *	2 \$	3 4		ž 2	202	05 0777	4.27	014408 10	0.808.20
CHRYSHN ULTIN UNDACTIFIER ULTIN UL	NAM	NAPSCHALFNE				2	12.0	•	5 2	14.7	200	177	25585 80	238910
HI 1000 ACTIVITIENE U.A. 1 1 1 1 1 1 1 1 1	7	CHRYSINE	4 6		. 4	3	×	1 4	3	: =	05 527	3 30	13852 20	621.00
NITRORIENZEANE	NY L	PLUORANTHENE	200		- 4	20	0 %		. 75	30	1338 90	4 26	22097 60	8 20
PHINOL.	4NTB	NITROBENZENE	18.Agu	_	3	20	0.9		34	30	1405 80	346	17400 90	6398 20
PHENEL UATO HILLS THE UACK I S TO 0 0 1 3 4 8 12 12 10 5 2 4 4 2 2 2 2 2 2 3 4 2 2 2 2 2 3 2 3 3 3 3	NII N	PHENOL.	ng/kg	2	3	20	09		34	30 30	2108 80	365	3112640	15558 70
PUREMIE u/A 1 3 50 60 3 34 189 3221 34 189 39 39 39 39 30 40 2 34 59 34 189 30 34 189 30 31 189 39 30 30 40 2 34 59 317 30 31 181 90 90 31 181 90 30 31 181 90 90 90 31 181 90	11.00	PLUORENE.	84∕8n	_	3	20	0.0	3	34	30 30	1352 10	3 25	4947 20	2001 70
INTROVENCINE UAX 1	PYR	PYRENE STREET	8 V 9		۰.	20	0 9	m 1	34	30 : 30 :	2124 30	344	18799 50	924370
NYTANDALIMINAL ULA 1 2 0 0 0 1 34 131190	10 1 C	DICHENT CENTER	8	. .	7	2 5	9 .	7 (* ;	50	3222 10	3.57	30000.00	15083 70
N.NINOSO DI NINOPYLAMINE LATE 1 50 20 1 34 29 13350 1371 147370 147470 1	SIN	N.NEWOSO, DE PARKY I AMENIE	8 (A)		7 -	2 \$,	7 -	ž 2	600	1379.30	341	1451190	00000./0
ACHAMATHYI H.H	NA NA	N NITROSO DI NIROPYI AMINE	# P P P P P P P P P P P P P P P P P P P			3 5	207		7.7	67 6	1335 60	3.33	17475 70	07.474
ANTHRACINE UPA 1 1 50 20 1 34 29 1306-60 32 1957-80 HENZAANPYRINE UPA 1 1 50 20 1 34 29 1306-60 32 1957-80 HENZAANPYRINE UPA 1 1 50 20 1 34 29 1390-80 32 0.555.23 HEHENYE	ACNY	ACENARCHYLENE	4			2 9	2.0		7.	200	1906 40	126	6142 40	0.00
HENZXA, PKH.NI: u_u_A_k i i 50 20 i 34 29 i333 30 3 0 1088 3 9 HIPHINY: u_u_A_k i i 50 20 i 34 29 1890 80 3 26 6.25 2.0	HINY	ANTIGRACIENE	, N	_	-	8	2.0	-	. ¥	53	1306 60	3.21	3957 KO	3957 80
HIPH:NYL ugAg 1 1 50 20 1 34 29 1890 80 3.26 625.20	нлР	BENZOAJPYRENE	84/3n	_	-	9	000	-	34	2.6	1333 30	9.0	10883 00	10443 00
	HIY	1/1/4									1777 777	3 37.	7007	

TABLE 5-13b - GLOBAL SUMMARY OF CONTAMINANTS IN TREATED SLUDGES

PRESTOR PRESENTATIONS NEW ALTERINSTITUS NEW ALTERINS NEW	INANI	TOTAL TANKE	UNITS QAQC GLOBAL URY CODE # SAMPS WEIGITY DET.	5 1 = 5 2 =		GLOBAL B SAMPS. TESTED	GLOBAL F FREQ. DET.	GLOBAL R PLANTS DEF.	GLOBAL # PLANTS	GLOBAL % PLANT PREV.	GEO. GEO. MEAN	SPREAD FACTOR	MAX. CONC.	MAIN. CONC.
INTERCACE GRONDING/CONDING Way 1 25 44 54 54 54 54 54 54	OXINS,	AND FURANS												
INTEXTOLOGODINES/ZORONNA \(\alpha_{\text{total}} \)	98CDD	OCTACLE ORODIBENZODIOXIN	ug/kg 1	_	%	64	53.1	22	34	7.30	7.10	384	303.60	0.0
HENCHOROPHENDONEN War 2 2 2 2 2 2 2 2 2	97CDD	I GEPTACED, ORODIBENZODIOX IN		_	10	49	20.4	x	ž.	23.5	200	321	72 60	₹ :
DES, IRESENTIDUS, PUES. PENTATOLIO GODINISA ZODIO, N. 1944 1 1 0 0 2 0 1 1 14 29 20 1 1 10 1 10 1 10 1 10 1 10 1 10 1	96CDD	HEXACIO CODIBENZO DIOXIN		~	7	64	7	7	34	60	2.40	132	380	
PASTINE BRITIDES, PCBS The Proposition of the Prop	95CDD	PENTACHLORODIBENZODIOXIN PENTACHLORODIBENZOPURAN		7.7		\$ \$	70		* *	57	2.50	512	99	3 2
PEDDER PEDDER	ESTICID	PES,HERBICHDES,PCBS												
CASA TOTAL CASA T	HPPDE	PP-DDE	ug/kg	_	34	20	0.80	22	34	73.5	11.10	272	08 90	36
2. Julionodomikovachi (action of proposed propos	TROBL	PCB, TOTAL.	ug/kg	2	32	20	0.40	23	34	67.7	114.10	4.58	5592 10	Ā.
A TATA CONDAINANE	324D	2,4-DICHE-OROPHENOXYACETIC ACID	ug/kg	ς.	នន	S :	9	22	34	23	75.00	581	2792.70	= 1
Colored Colo	Y IOL	ALPIACHBORDANE	08/kg		77	2 5	4 4	<u>.</u>	4 2	60.0	0.00	4 02	8 20	120
### STATE CHENCHENCHEN ### 1	5101	GAMMA CHEORDANE	100	٠.	77	8 8	45.0		7.	52.9	6.80	2.58	38 00	4
### STATE OF PETER CHECK CHECK CHECK NO. 1	CHCB	I IEXACTB OROBENZENE	a Wan	. ~	77	200	42.0	19	34	55.9	7.00	2.96	123 70	-
24.5-TRIO ORPHENOXYCITICACID 24.5-T	HHICB	BETA-BITC (HEXCHLORCYCLJUEXANE)		-	19	20	38.0	91	34	47 1	8.80	4 39	621 70	3.2
DEJLIMEN OF PRESENCE ACCOUNTS AND ACCOUNTS A	3SII.V	SII.VEX		3	18	20	36.0	15	34	1.4	92.70	2.94	1264 80	16.8
Delizitania	3245F	2,4,5-TRICLORPHENOXYACETIC ACID	ug/kg	3	10	20	32.0	4	34	41 2	84 40	313	1443 30	87
MINITOXYCHECKYCLHEXAND WALE 1 2 50 50 0 15 34 82 510 442 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 444 750 750 750 750 750 750 750 750 750 750	DIE.	DISLURIN	ug/kg	. 5	2 :	S :	30.0	£ :	4 5	38.2	6 50	35	384 20	¥ ;
Colomon Michiekatuline Yaliikaani) Michiekatuline Yaliikaani) Michiekatuline Yaliikaani) Michiekatuline Yaliikaani) Michiekatuline Yaliikaani) Michiekatuline Yaliikaani) Michiekatuline Yaliikaani Michiekatuline	DMD	METHOXYOLLOR	3		2 :	0 0	30.0	2 2	4.5	7 98 7	3 5	7 8 6	00 5697	7.17
Heart Correction Correct Correction Correc	MINIO	ALDRIN	9 Van	٠.	7 =	8 8	22 0	3 0	, ¥	38	230	267	7 8	5
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ES MENTA BERGERATURORCYCTHEXARE) \(\buggin{array}{c ccccccccccccccccccccccccccccccccccc	OPCNB	PCNS		7	7	75	9.1	2	7	14.3	22	1 21	62.70	8
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TRIANCIO MORPHIANE \$\sqrt{\pi}\pi 1	0.000	CHLOROPORM	11.8/kg	-	12	20	24.0	12	34	35.3	441.70	4 33	12937 10	76
14 DICH DROBHENZEN \(\frac{\psi_4\ln'_4}{\psi_4\ln'_4}\rbrack \frac{\psi_4\ln'_4}{\psi_4\ln'_4}\rbrack 2 & 34 & 59 & 272.70 & 328 & 2643.70 \\ \text{13.1.PMCHIANGH Wugar} & \text{ugar} & \text{1 } & 50 & 20 & 1 & 34 & 29 & 25490 & 34 & 233.30 \\ \text{13.1.PMCHIANGH Wugar} & \text{ugar} & \text{1 } & 50 & 20 & 1 & 34 & 29 & 25490 & 35 & 6343.20 \\ \text{14.1.DMCHIANGH Wugar} & \text{ugar} & \text{1 } & 50 & 20 & 1 & 34 & 29 & 26410 & 35 & 6044.20 \\ \text{14.1.DMCHIANGH Wugar} & \text{ugar} & \text{1 } & 50 & 20 & 1 & 34 & 29 & 26410 & 35 & 6044.20 \\ \text{14.1.DMCHIANGH Wugar} & \text{ugar} & \text{15.1.DMCHIANGH Wugar} & 15.	STEIR	TETRACIB OROGITIVI ENE	us/kg	_	7	20	4 0	7	34	8.8	285 40	3.51	3359.40	2834 %
HIXANOI. 1.1,1-INCIULONOETHANE u _M Λ _k 1 1 50 20 1 34 29 1599 20 14.28 143678.20 14 CHIGRODIRICOMOMETIANE u _M Λ _k 1 1 50 20 1 34 29 2.49 33 604.40 CHIGRODIRICOMOMETIANE	K214CH	1,4 DICHI OROBENZENE	ug/kg	_	7	\$0	0.4	2	34	6.50	272.70	3 28	2643 70	220 00
1.1.FICHLORODITIANE ug/kg 1 1 50 20 1 34 29 25490 334 233.30 (TH.ORODIDHOMOMETIANE ug/kg 1 1 50 20 1 34 29 26410 353 663430	THEX	HEXANOL.	us/kg	. 7	-	20	2.0	-	×	2.9	11979 20	14 28	143678 20	143678 2
CHI.OHODIBHOMOMI:THANE ug/L _B 1 1 50 20 1 34 29 26410 353 6644 30	THID		84/81	_	_	50	2.0	-	35	2.9	254 90	334	2323 20	2323 2
	XICDBM		us/kg	_	-	•								

Table 5-14 SUMMARY OF CONTAMINANTS DETECTED IN ANY SAMPLE TYPE

			Metal	Metals and Cyanide	n1de	Base Acid	Base Neutral and Acid Extractable	and able	Dlox1	Dioxin/Furan (2)	(2)	Pest He	Pesticides and Herbicides	and		Volatiles	10
Sample Type	No. Plants	No. Samples	No. Det.	Max % Plant Prev.	Max % Freq. Det.	No. Det.	Max % Plant Prev.	Max % Freq. Det.	No. Det.	Max % Plant Prev.	Max % Freq.	No. Det.	Max % Plant Prev.	Max % Freq.	No. Det.	Max % Plant Prev.	Max % Freq. Det.
Raw Sewage	37	275	15	100	7.66	31	86.5	60.7	3	10.8	7.4	29	100	77.5	22	37.8	15.7
Primary Effluent	7	39	14	100	100	9	71.4	46.2	7	26.8	25.0	16	85.7	72.5	12	85.7	55,3
Lagoon Effluent (4)	2	12	10	100	100	0	ı	ı	0	1	1	7	100	100	0	1	ı
Secondary Effluent	28	224	15	100	100	24	14.3	3.1	4	14.3	9.1	24	100	78.0	19	64.3	16.5
Tertiary Effluent (4)	(4) 1	10	13	100	100	15	100	30.0	0	,	,	00	100	90.0	6	100	50.0

Notes:

Treated Sludge (2)

(1) The number of samples may vary depending on compound group. The number given is representative of most compound groups. Refer to Table 5-4(a) - 5-10(a) for exact numbers.

31.4

41.2

01 01

78.4

79.4

27

50.0

58.5

82.3

85.3

15

100

100

16

51 50

34

Raw Sludge (2)

94

S

35.3

- (2) Samples are 5-day composites.
- (3) The number of contaminants detected in the sample type.
- (4) Summary data for lagoon and tertiary effluents is included for the sake of completeness. Due to the small number of facilities sampled, this data should be interpreted with caution.

Only 5 base neutral and acid extractable compounds (M-cresol, Phenol, Phenanthrene, Butylbenzl phthalate and Naphthalene) were detected at more than 20% of the plants studied for any sample type. With the exception of the 5 compounds, base neutral and acid extractable compounds were detected at a maximum of 14 percent of plants and in a maximum of 8 percent of samples, for all sample types. Interestingly, the maximum prevalency and frequency of detection of base/neutral acid extractable compounds in all secondary effluent samples was substantially smaller than in the raw sewage, primary effluent or sludge sample types.

The maximum frequency of detection and prevalency of dioxins and furans was relatively low in raw sewage and in primary and secondary effluent streams. In contrast, the number of dioxin/furan compounds detected, and the maximum frequency of detection and prevalency were markedly greater in sludge streams.

Approximately the same number of compounds in the pesticide/herbicide group were detected in raw sewage, secondary effluent and raw treated sludge streams. About 50 percent fewer compounds were detected in primary effluents. This may be attributable to a lower number of primary plants monitored. The maximum frequency of detection and prevalency is quite large and reasonably uniform for all sample types.

The largest number of volatile compounds were detected in the raw sewage and secondary effleunt streams. Maximum frequency of detection and prevalency were quite variable among the sample types ranging from 32 percent to 85 percent prevalency and 15 percent to 55 percent frequency of detection.

6.0 SUMMARY

This interim report on the WPCP Pilot Monitoring Study was prepared to present the study program methodology and the analytical data in conjunction with the QA/QC results. Also included are the individual plant information summaries (Appendix A).

The final report will present a more detailed review and analysis of the study results. More specifically, the report will include the following:

- O An assessment of the impact of industrial, residential and sanitary sewer inputs on the nature and loadings of HCs observed in the raw wastewaters and sludges.
- O An estimate of HC loadings discharged in the sludges and liquid effluents of the 37 WPCPs.
- o An assessment of the ability of WPCPs to remove HCs and identification of the factors affecting HC removal efficiency.
- o A prioritized list of contaminants observed at the 37 WPCPs.
- o The major concerns affecting the implementation of the monitoring regulation and recommendations to address problem areas.

7.0 REFERENCES

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